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— UP moves into COIN II

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RSC News

Restructuring the Northeast: Plan 1

Northeast legislation passed by Congress in late December and signed by the President early this year gave the Department of Transportation just 30 days to come up with initial recommendations on the areas to be served by a restructured Northeast railroad system—and, 30 days from the day the law took effect, DOT announced its choices. Among the key points:

—About 25% of total track mileage in the Northeast would be dropped. Better than 95% of existing freight service would be retained, however, which gives a pretty good idea of the use to which a lot of existing track is currently put.

—Fewer than 20 cities in the Northeast would retain competitive rail freight service, while a number of small towns, ranking low in traffic-generation, would lose service altogether. Out of 184 designated "zones" in the area, however, only two (one in Virginia and the other in Rhode Island) would have no service remaining.

—With the drastic streamlining of routes, major modernization projects could be justified and could be carried out at considerably less cost than if such projects were applied to the Northeast rail system as it now stands. DOT's estimate is that major upgrading of existing signaled track would cost perhaps $8 billion, but that with the proposed system no more than 25% would need rebuilding. Annual costs for maintenance might drop from more than $770 million to about $450 million; other substantial cost-savings on such items as switching expense could also be anticipated.

● **15,500 to go.** In terms of actual mileages, DOT's plan contemplates dropping more than 15,500 miles out of the total 61,000-plus miles of track inventoried in the Northeast. One possibly-complicating factor is that about 5,000 of the track miles slated for abandonment are owned by now-solvent railroads. This track could not be taken out of service without agreement from the owning lines—but DOT is inclined to think that profitable roads may be just as interested as bankrupt roads in getting rid of trackage that is being operated at zero profitability or worse.

It should be noted, too, that even if the DOT plan were to go through as written—which is unlikely—there's a good probability that some of the to-be-abandoned track would remain in service. Northeast legislation also contains provisions for subsidization of unprofitable lines under a joint Federal/local subsidy plan.

SECRETARY Claude S. Brinegar and DOT: Working on Congress' timetable for restructuring the Northeastern railroads, they've come up with an initial plan for trimming excess plant.

Essentially, the 25% of trackage to be abandoned was determined by assessments of present volume, figured on a carloads-per-mile-per-year basis. On this scale, points generating fewer than 75 cars would lose service; in some instances, so would points generating a higher level of business, if they failed to meet certain other conditions. At the same time, branchlines would be retained if they give mainline access to points providing profitable business and/or if a given line is the only access to the main route.

DOT also proposes a reduction in mainline duplication, although it does not go so far as to propose tearing up all duplicate mains. Lines not tabbed as main routes would, in general, be held in a standby status or used for serving shippers who could not otherwise be served.

On a state-by-state basis, New Hampshire would lose the greatest percentage of existing track, with close to half slated for abandonment. More than one-third of existing track would be dropped in both Michigan and Indiana. In some cases, lines would be abandoned outright; in others, a losing line might be sold to a solvent road in order to preserve competition.

DOT's action carried out the first mandate of the Regional Rail Reorganization Act of 1973, which was that its conclusions and recommendations on service to be provided be submitted to Congress, to the United States Railway Association (the non-profit organization set up by the Act which is to draw up the final plan, create the for-profit operating company and handle the necessary obligation and loan work to get the system started), and to the ICC-based Rail Services Planning Office (also set up by the Act).

● **Timetable fixed.** From this point on, the timetable will work this way:

—By May 1, the Rail Services Planning Office is to have conducted hearings and prepared its evaluation of the DOT recommendations. By that same date, bankruptcy courts working with each Northeast bankruptcy are to have determined whether the individual roads are capable of income-basis reorganization under the traditional method.

—By the end of June, the Rail Services Planning Office is to publish standards for figuring reasonable rate-of-return.

—Four months later, at the end of October, USRA is to publish its preliminary system plan. By that time, too, the operating company, the Consolidated Rail Corp., is to be established.

—By yearend, the Rail Services Planning Office, again after holding hearings, is to have ready its evaluation of the USRA plan.

—About a year from now, or Feb. 25, 1975, the USRA executive committee is to submit its final system plan to the USRA board. This board will be made up of four government representatives, plus other representatives to be chosen by various groups: One each by the AAR, the AFL/CIO, the National Governors Conference, the National League of Cities and Conference of Mayors, and financial interests; and two by shipper groups. USRA's executive committee will be made up of the four gov-

(Continued on page 6)

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RSC News

(continued from page 4)

ernment representatives and two other members to be selected by the board.

—After that, things should move reasonably quickly. USRA's board has a month to approve the plan and send it to Congress. The ICC has another month to submit its evaluation of the final plan. And one month later, or May 26, 1975, the final system plan becomes effective, provided that neither House nor Senate votes a resolution of disapproval.

—On Aug. 24, 1975, the final plan is to be submitted to the bankruptcy courts and to a special court which will handle transfer of rail properties. CRC is to start up within 20 days after that.

● **How many dollars?** In terms of money, USRA may issue obligations of a maximum $1.5 billion, with no more than $1 billion of that going to CRC. Of the $1 billion, at least $500 million must be spent for improving CRC properties. The $500 million remaining with USRA is to be used for improvement of passenger lines in the Northeast Corridor, lines which are to be sold or leased to Amtrak after CRC begins.

Among other financial aspects of the program: (1) Up to $85 million is available to bankrupt lines so that they can continue to provide essential services while the final plan is under development; (2) up to $150 million is available for interim plant and equipment improvements on lines that will be in the final plan; (3) $90 will be available in each of the next two fiscal years for branchline subsidies on a 70/30 Federal/local sharing basis; and (4) up to $250 million will be available as protection for employees adversely affected by the restructuring.

Detente: Will it involve S&C?

Detente between the United States and the Soviet Union now extends to transportation—and certain cooperative projects may sooner-or-later involve signal and communications officers on both nations' railroads.

In the rail transportation area, four specific areas are marked for study, including study of "electrified railroads . . . design of electric motive power, catenary and power-supply substations." In addition, the rail studies are to be supplemented in the future "by additional cooperative activities in the areas of high-speed railroad passenger traffic, rolling-stock design and systems of automated control of railroad freight operations."

The agreement covering this transportation-cooperation program was signed recently in Moscow by Robert H. Binder, assistant secretary of transportation (designate) for policy, plans and international affairs, and G. V. Aleksenko, deputy chairman of the Soviet committee for science and technology.

The first transportation delegation from the U.S. to visit the Soviet Union went in 1970. The protocol signed in January was an outgrowth of an agreement signed by the U.S. and the USSR last June, and the joint panel made up of representatives of the two nations plans a second meeting late this year.

Working groups in five areas—marine transportation, civil aviation, rail transport, automobile transport and transport-facility construction—have been assigned to prepare specific cooperative programs and present them for consideration and approval by both countries' agents.

In addition to electrification, work is supposed to be going forward on track design and maintenance and on transportation of perishables. In addition, cooperation possibilities will be explored this year in urban transportation and cargo data transmission.

Automatic collection for PRT

Fully-computerized, automatic fare-collection systems are coming to rapid transit for the first time—at least the systems are coming if you're going to define transit to include the Personal Rapid Transit (PRT) system in Morgantown, W.Va. Boeing Aerospace has awarded a $115,000 contract to Western Data Products, subsidiary of Cubic Corp., to supply automatic passenger gates for the three boarding stations on the Morgantown PRT route. The gates will provide traffic-flow data to the computerized PRT and will control fare collection. Through a Destination Select unit located at each gate, passengers select their off-load point, the information is fed into a computer and PRT cars are dispatched for pickup.

In the beginning, the system will accept a special magnetically-coded plastic fare card, but the supplier says it could be modified to accept credit cards and/or cash.

Western Data Products is also supplying automatic fare-collection equipment to Illinois Central Gulf, and special ticketing equipment to BART.

BRS, LI agree on new contract

In the wake of an emergency-board report, Long Island and the Brotherhood of Railroad Signalmen have settled a long-standing dispute with an agreement that provides for retroactive wage increases of 6% Jan. 1, 1972, 10% Jan. 19, 1973, and 10% Jan. 1, 1974.

Among other provisions of the pact:

—New-employee wage rates for the first 240 days of service will be 80% of the rate in effect for the position to which they're assigned.

—A 13-cent differential paid employees who are required to operate motor vehicles will be abolished, except that it will be red-circled with respect to present drivers.

—LIRR can make a new classification, Technician S&C, where equipment and facilities used are similar and there has been interbidding.

Learn and earn

The manpower committee of the Institute of Electrical and Electronics Engineers has a new report out on career outlook in engineering—which says that while career opportunities in electronics will continue to grow, "it will be necessary to remain flexible and ever-ready to transfer to another area as activity changes in focus and grows in turn to meet market demands."

The IEEE report urges engineers to stay current with new developments and warns against over-specialization in education. It adds this: "Employment problems are seldom encountered where the individual has maintained a regular program of study to update and broaden his background."

What ctc can do

In its Northeast studies, DOT tends to confirm one of the points that's been made for years about improvements in signaling—namely, that ctc can increase the train capacity of a single-track railroad by 50% (and of a double-track line by one-third).

In terms of tonnages in the DOT example, gross tons per year on single track climbs from 62 million to 93 million when automatic block signals are replaced by ctc; on double track, the gain is from 186 million to 250 million. (DOT also makes the point, of course, that the figures represent engineering capacity and that practical capacity will be affected by terrain, train size, tonnage, operating procedures and so forth. Noting too that

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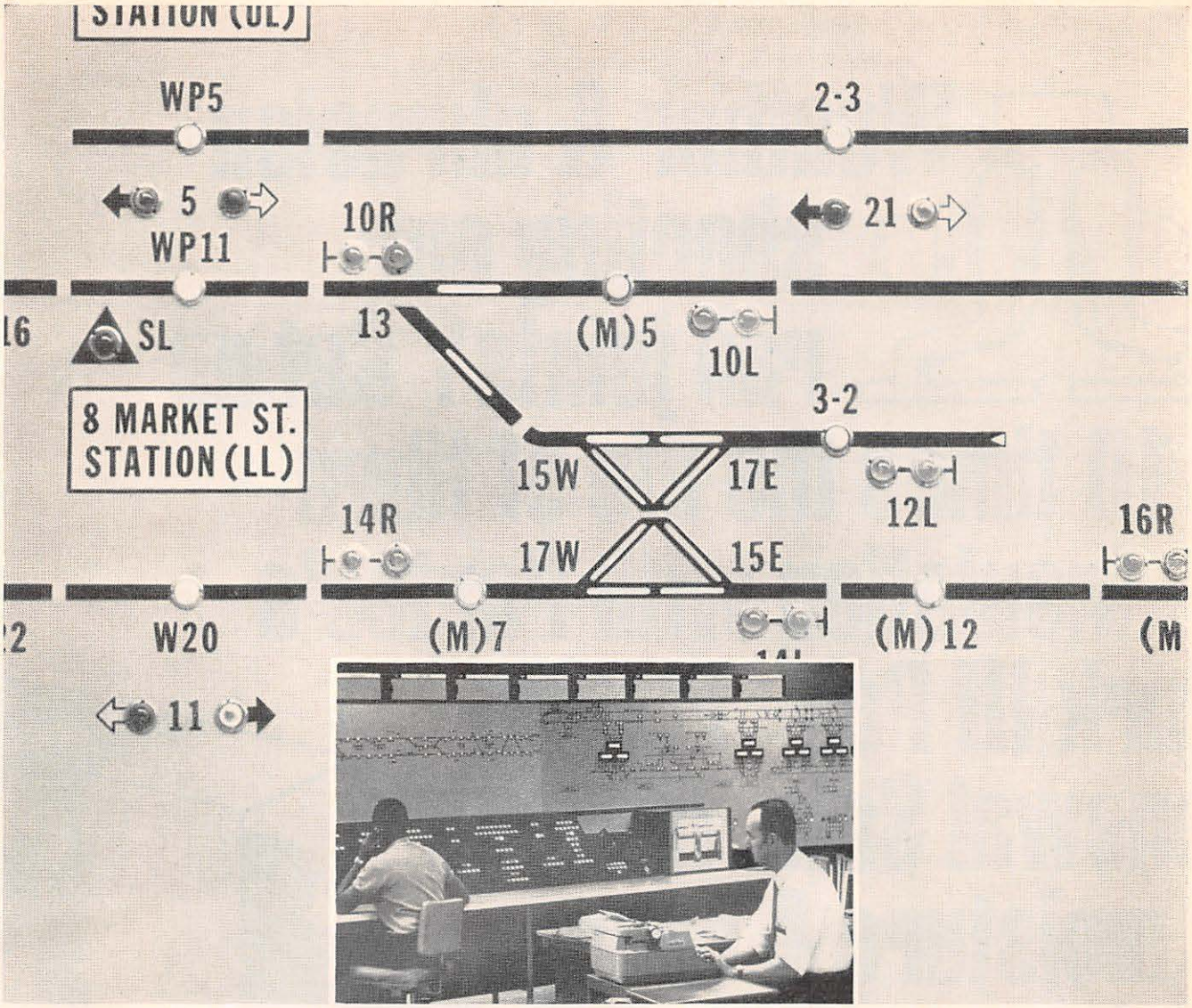

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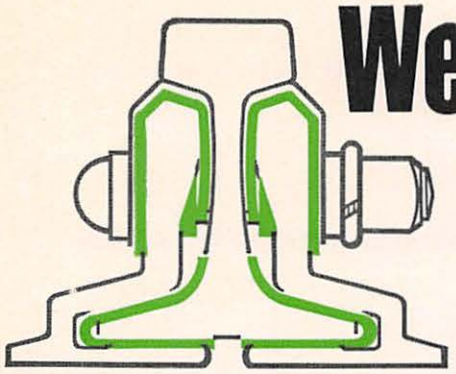

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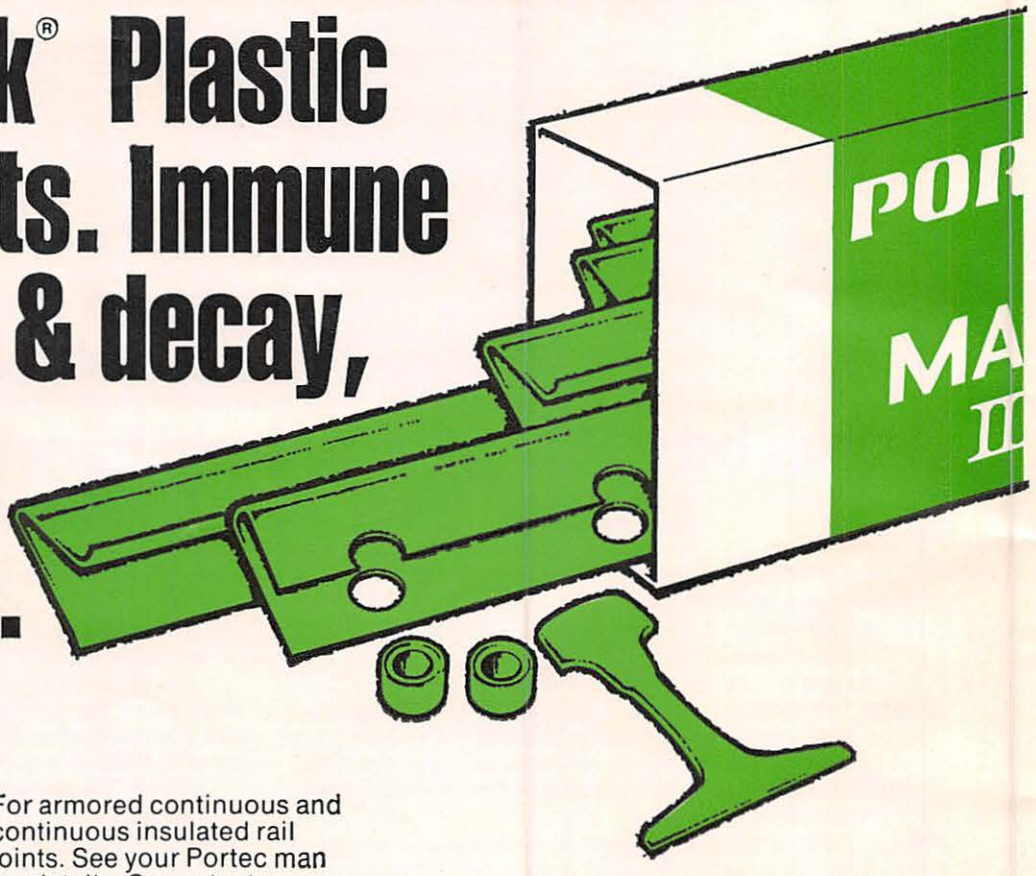

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RSC News

(Continued from page 6)

installation of ctc did not in fact bring a proportionate increase in number of trains, DOT observes that the impetus for ctc installation was not so much the increasing of system capacity as it was the reducing of labor costs associated with other signal systems.)

"Man and MIS"

The Society for Management Information Systems will bring "people" into its sixth annual conference, to be held Sept. 11-13 in San Francisco. Theme of the meeting will be "Man in Systems—the Human Element in MIS."

Three major areas relating to the theme will be covered: (1) Psychological considerations in MIS design; (2) the influence of communications on MIS design, including the psychology of communicating data to management and the impact of teleprocessing; and (3) a review of the continuing evolution of man/machine relationships in MIS design.

Edison gets GS

Edison Battery Division of McGraw-Edison has acquired General Systems, Inc., for which Edison has been exclusive distributor for the past 11 years. General Systems' plant will remain in Erie, Pa., and will be known as the Electronics Plant of the Edison division, with all products manufactured under the GS name now to be made and marketed under the Edison name.

The "new" Chessie

Chessie System is reorganizing its operating regions and divisions to improve service and managerial control. As John T. Collinson, vice president-operations and maintenance, puts it, "This innovation will utilize advanced management practices and technology. Computers, electronic communications networks and new systems for scheduling and equipment utilization will be put to the maximum use in the new setup, which started with a pilot division two and a half years ago."

In the new scheme of things, Chessie will have division managers; reporting to these managers will be superintendents of train and yard operations, freight-car utilization and agencies/yard offices. Division managers will report to the system's four regional general managers.

Crisis solution?

What's the answer to the energy conservation problem? According to John W. Simpson, president of Westinghouse Power Systems, it's less use of oil and gas and more use of electricity generated by plentiful fuels—coal and uranium. Speaking at an Institute of Electrical and Electronics Engineers' conference on energy conservation, Simpson noted, among other things, that electric substitution in the form of electric vehicles and rapid transit could produce savings equivalent to 1.5 billion barrels of oil a year. And he warned: "If we continue to allow electricity to be identified as part of the problem rather than as a solution (to the crisis), then we're headed for real energy troubles."

System controls "order board"

MBTA/GRS

Contracts totaling more than $5,788,000 have been awarded to GRS by the Massachusetts Bay Transportation Authority for supply and installation of equipment to improve and expand automatic train control and signaling facilities in Boston.

DOT/Rohr/Rucker

Rucker Company's Insul-8 Division has the $1-million-plus contract for manufacture and installation of power rails for high-speed-train test trackage at DOT's Pueblo test center. Rohr made the award; Insul-8 will use a proprietary process to produce the rails, which will be stainless-steel-capped aluminum extrusions.

The rails will be three-phase conductors installed along 3.13 miles of test track, over which will be run a prototype 150-mph air-cushion vehicle. Rucker's French licensee previously supplied power rails for a 100-mph air-cushion test in France.

BN/WABCO

WABCO's Union Switch & Signal Division has the order from Burlington Northern for installation of centralized traffic control between Galesburg and Barstow, Ill., as part of a BN upgrading of its line between Galesburg and Savanna, Ill. Control will be from a section added to the existing traffic control center at Cicero, Ill.

ICG/Xerox

Illinois Central Gulf is acquiring a Xerox 530 computer system, valued at $83,000, for performance of general engineering and cost-estimating tasks in the engineering department.

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Railroad computer applications:

By Robert W. McKnight
Contributing Editor

From all indications railroads are going to make better-than-ever use of the computer in 1974. Union Pacific, for instance, is taking COIN and turning it into COIN II (see following story). Other roads are planning improvements in data-processing systems over a wide range of applications.

And, it's going to cost money.

Surveys show that U.S. and Canadian railroads and rapid-transit agencies will be spending about $109 million this year, with most of the total—more than $106 million—going for non-capital-investment costs. That's an over-all 3% increase from 1973 spending figures. And, while capital costs are expected to be down for railroads and both capital and non-capital expenses will be down for transit agencies, railroad non-capital costs will show a sharp increase, from an estimated $84.5 million last year to a projected $98.4 million in '74.

Much of the work to be done will be in the area of systems development and implementation, along with extensive re-programming efforts to make computer operations more efficient. Some roads are involved in re-programming in going from Disk Operating Systems to Operating Systems (IBM 370 series). Others are involved in streamlining computer languages to more simplified versions, use of more assembly languages and in general in working toward two basic languages—one for business terminology and one for engineering terminology.

Other activities will be centered on provision of complete online, realtime systems—and on provision of more computer applications. Extensive use is being made, for example, of Repetitive Waybill Codes (RWC) through which repetitive information can be generated automatically for various uses, ranging from freight billing to market research and a number of other statistical uses.

On the automatic-car-identification front, things have been and may stay relatively quiet—mainly because of the dirty-label problem. Hopefully, however, 1974 will see significant progress in this area. And, during the year, the Chicago Railroad Terminal Information Systems, Inc., aci system should come into full service—and the results of this operation could well be a spur to a number of roads to install more scanners.

But, what were individual roads' 1973 accomplishments, and what are their plans in data-processing improvement for 1974? Railway System Controls' survey shows this review and outlook:

EDP SPENDING: HOW MUCH—AND WHERE?

EDP Expenditures	1974 (Millions)	1973 (Millions)	Change from 1973
U.S. and Canadian railroads			
Capital	$2.4	$3.6	−33%
Non-capital	98.4	84.5	+16
U.S. and Canadian transit			
Capital	.2	.8	−75
Non-capital	8.1	17.5	−54
Total	**109.1**	**106.4**	**+3**

ALASKA: 1973 projects completed—Developed specifications for new computer systems and prepared request for proposals for release to equipment manufacturers.

1974 projects planned—Install new computer system and convert all programs and files to ANS COBOL language and formats. Install a small communications subsystem, 5 non-intelligent terminals. Central processor will have 120k bytes of main memory, 100 million bytes of on-line storage, magnetic tape capability, virtual storage and multi-program capability.

ALGOMA CENTRAL: 1973 projects completed—Railway payroll.

1973 equipment installed—IBM 2020, 2203, 2560; two 029's, 059 and 082.

1974 projects planned—Marine division payroll.

BAY AREA RAPID TRANSIT DISTRICT: 1973 projects completed—Major modification to the payroll system to implement the District's first labor union contract.

1973 projects completed to be implemented in 1974—Maintenance planning system that will assist in planning, scheduling and controlling maintenance operations. Specifically the system will identify jobs and schedule them, monitor failure trends and identify equipment that requires greater or less maintenance, identify equipment failure under warranty, provide performance reports relating to labor and equipment usage and status reports on modification projects, maintenance history. Cash reporting system provides control of cash flowing into fare-collection equipment at passenger stations and the cash-handling building; it produces various daily-weekly-monthly reports by machine-station-line and system for treasury, accounting, audit, cashroom and top management.

1973 equipment installed—Univac series 70/45 that was under lease was purchased. Configuration includes 130k cpu, four tape units, four disk units, one each of printer, punch and reader.

1974 projects planned—Traffic reporting system will report total system-wide patronage by time of day, station of entry and exit.

BESSEMER & LAKE ERIE: 1973 projects completed—Expanded the centralization on-line material inventory control system; continued expansion and enhancement of the car- and train-control real-time system.

1973 equipment installed—One IBM 3705 communications control processor; seven Memorex 660 disk drives; six Ultronic Videomaster 7700 crt systems; six Ultronic Videomaster 7100 crt systems, and two 16-channel multiplex systems.

1974 projects planned—Further expansion of the car- and train-control

Still growing

real-time system; improvement of car accounting processing; decentralization of source document input process.

BURLINGTON NORTHERN: 1973 projects—Continued work on a new customer billing and revenue system; commenced design of a total disbursement system; completed installation of real-time car-control system; completed installation of four aci scanners; implemented new stockholder record system.

1973 equipment installed—IBM 370/145, later replaced by IBM 370/168 computer; removed one IBM 360/65 computer; installed 118 IBM 1050 terminal devices, 49 IBM 2770's, 33 model 35 Teletypes, 21 IBM 3420 tape drives, six IBM 3330 disk drives and 12 Itel 7330 disk drives.

1974 projects planned—Install an additional IBM 370/168 computer, implement customer billing and revenue system, continue work on total disbursements system, and continue work on repetitive waybilling and a yard computer system.

CANADIAN NATIONAL: 1973 projects completed—New applications included reconciliation of sales, redemption and stock control of money orders; car assignment monitoring; TRACS various capabilities in car-movement control included trip planning, car utilization, train performance.

1973 equipment installed—Univac 9314 replaced with U9480 at Toronto.

1974 projects planned—System release order project (establishing and maintaining of a purchases/supplier data base); in-store processing project (mini-computer study); CNT facilities control system (a system to monitor and control a communications facilities network); TRACS' major emphasis will be on the implementation of the basic traffic reporting segment of TRACS and the on-line inquiry and-car distribution programs. This will provide fast retrieval operating information for trains, cars yards, stations and industrial areas. In addition, WIN (Waybill Information Network) will be implemented through the Repetitive Waybill Code (RWC).

CP RAIL: 1973 project completed—Personnel data base. 1973 equipment installed—IBM system 370/158, four tape drives, four disk drives, nine crt's (3277), and five crt's (3275).

CENTRAL RR NEW JERSEY: 1973 projects completed—Responsibility accounting system; all programs shifted from IBM 1401 to Univac 9400 computer. Univac 9400 put on-line in communications mode with field terminals in yard offices being installed.

1974 projects planned—Will be implementing a computerized on-line, car-reporting system with a waybilling and freight-collection system to follow.

CHESSIE SYSTEM: 1973 projects completed—Acceptance testing of 17 aci scanners at five locations finished; implemented computerized train-and-engine employees timekeeping system; implemented computer system for analyzing performance of major manifest freight trains; implemented first phase of computer system for maintaining UMLER file; implemented computer system for determining gross traffic tonnage density by segments of road.

1973 equipment installed—Eight Burroughs TC-522 intelligent terminals in Baltimore terminal for car- and train-movement reporting.

1974 projects planned—Start implementation of initial phase of company-wide information system based upon distributed computer capability. Includes control of data collection and administrative communications lines, expanded car- and train-movement re-

HARDWARE EXPENSE for computer systems may be down this year—but railroads will be emphasizing new applications and a new computer generation.

porting and installation of intelligent terminals for car reporting, waybilling and freight billing.

CHICAGO & NORTH WESTERN: 1973 projects completed—Produced a computerized short-line-distance mileage tariff; installed UP/C&NW car tracing data exchange; installed A1 unit-train inquiry system; installed track-by-track car-standards control on Proviso computer; installed computerized report transmission techniques to division offices.

1973 equipment installed—Replaced two Univac series 70/45 computers with one Univac 70/6; replaced Univac 8590 disk drives with Univac 8440 disk drives; replaced Univac mass storage units with Univac 8440 disk drives; installed second CMC-11 key-to-disk data entry system for a total of 32 key stations sharable by two computers and disks; added video car-tracing ability from three additional yards and one in the materials department.

1974 projects planned—Motive power status control system; centralized accounts receivable system; mini-computer control system at Proviso material-distribution center; computerized rate-verification system.

CHICAGO TRANSIT AUTHORITY: 1974 projects planned—Claims system; bus monitor system; bus maintenance system.

DENVER & RIO GRANDE WESTERN: 1973 projects completed—Moved computers to new general office building without disruption of service; designed new transportation system using IMS as data-base management system; converted to IBM 370/145 computer from a General Electric installation; produced new reports including bad orders, switch loads, and traffic information; completed auto-mating voucher distribution by responsibility account; incorporated salesmen indentifications on traffic analysis reports; completed preliminary design for new terminal-control system using IBM 3270's to maintain perpetual inventory of cars by track in central computer at railroad headquarters.

1973 equipment installed—IBM 370/145 with disks, tapes, other equipment.

1974 projects planned—Implement new TCS system including interface of mini-computer system with new centralized dispatching office equipment to provide computerized train-sheet data-recording and -collection system for all train operations; convert data communications to IBM system 7; implement IMS TP system and integrate all railroad data to common data base.

DETROIT, TOLEDO & IRONTON: 1973 projects completed—Car repair waybilling, repetitive waybilling, on-line communications.

1973 equipment installed—Two IBM 370/135's and 2770 field terminals.

1974 projects planned—Revised revenue reporting system and complete aci installations.

ELGIN, JOLIET & EASTERN: 1973 projects completed—Installation of an aci system in Joliet, Ill., with three scanners and decoders which are real-time and interface directly to an Inter-Data 100 mini-computer. This mini-computer communicates directly to the main car-control computer. Main car-control computer moved to Pittsburgh; therefore, all on-line computer information from EJ&E in the Chicago area is processed in Pittsburgh and is transmitted back to EJ&E on a real-time network.

1973 equipment installed—Six new IBM 3420 tape readers for Joliet batch system; replaced existing IBM 360 batch computer with an IBM 370 batch computer.

1974 projects planned—Install an additional two aci scanners within Kirk Yard area, Gary, Ind.

ERIE LACKAWANNA: 1973 projects completed—Two new accounting applications and a new sales analysis system.

1973 equipment installed—Two IBM 370/135's replaced two IBM 360/40's.

FRISCO: 1973 projects completed—Implemented the following computerized systems: Per diem reclaims (Rule 15, 22 and Special); diesel maintenance control system; equipment control system; profitability analysis of traffic; and system per-diem claims.

1973 equipment installed—IBM 370/158, VS II system, 3330 disk drives, and 3420 tape drives.

1974 projects planned—Implement per-diem reclaim reconciliation system, and reconciliation of foreign-line equipment per-diem claims.

ILLINOIS CENTRAL GULF: 1973 projects completed—Data quality program re-established in July, and has made significant advancement in reduction of errors and omissions in data transmitted to the computer used for processing for the accounting, operating and traffic departments. At Mobile, Ala., computer center—Implemented processing of car-accounting, car-repair billing, M/E and M/W payrolls and waybill auditing system. Systems for verification of interline forwarded settlements, life and medical cash payments and seniority rosters placed in operation. Computer peripheral and key entry equipment upgraded for expanded and more economical operations. Data Processing Division—Improvement and upgrading of data-processing operations' peripheral operations areas based on Price Waterhouse/ICG operations review study. Establishment of data-control functions and implementation of procedures applicable thereof; consolidation of tape library facilities and implementation of the necessary procedures for controlling the library facility; establishment of the data-analysis function and implementation of the required procedures applicable to it; establishment of the standards and control function and its attendant operating procedures; establishment of off-premise storage facilities to protect critical tapes. Computer Systems Division—T&E guarantee statements; implementation of merged ICG payroll; implementation of new US Savings Bond subsystem; remote crt support; enhancement of teleprocessing system with additional peripheral storage; implementation of new interline received accounting system; support of consolidation of various departmental functions due to merger.

1973 equipment installed—Two IBM 370/155's during first quarter 1973; also installation of IBM 360/40 and upgrading of Inforex equipment including high capacity disks; additional data preparation equipment placed on order including eight Inforex stations; replacement of IBM 026 and 056 key punch equipment with IBM 029 and 129 units; replacement of 16 Telex tape drives with 16 IBM 3402 tape drives; installation of IV Phase remote controller and crt's; installation of IBM 3705 communications control equipment.

KANSAS CITY SOUTHERN: 1973 projects completed—Computerized preparation of interline-received abstracts; conversion from Mohawk KDS to IBM 3270 data-entry system; installation of local 3270 systems in the auditor of revenues department for data entry; programming of a Univac 9200 to run as a HASP RJE terminal; creation of approximately 9,000 division masters used for computerized abstracting.

1973 equipment installed—Two IBM 3705's, one IBM 370/158, one IBM 3333, and 20 remote IBM 3270 information systems.

1974 projects planned—Install OS VS-2; replace present real-time reporting system using 1050's with a system called SHADDO which utilizes IBM 3270 systems.

LEHIGH VALLEY: 1973 projects completed—Implemented new interline revenue accounting system which

matches interline-received waybills against a division master file to produce computer-prepared abstracts for interline settlement. A by-product of this system is a marketing master file containing complete waybill information along with the proportion of revenue due each railroad in the route of movement. Implemented train-and-engine-service payroll system.

1973 equipment installed—Added a fourth Memorex disk drive and 32k additional memory.

1974 projects planned—Car movement reporting system, and profitability information system.

MAINE CENTRAL: 1973 projects completed—Computerized financial reports including income accounts, balance sheets and budgets. Vacations for nonoperating employees controlled by computer.

1974 projects planned—Installation of repetitive waybill system and accounts payable.

METROPOLITAN TRANSPORTATION AUTHORITY (LONG ISLAND): 1973 projects completed—Conversion of 24 existing computer systems to operate in an OS environment rather than a DOS environment; development of a personnel planning system; development of an exception payroll system for train-and-engine employees. Extension and enhancement of the following systems: Demurrage, physical inventory, project inventory, law claims, pass issuance, passenger revenue accounting, freight revenue accounting, simulations and payroll.

1973 equipment installed—IBM 360/22 as a communications link with IBM 370/22 at Metropolitan Transportation Authority data center, one IBM 2741 desk top terminal, two Memorex 1240 desk top terminals, one IBM 3741 data entry device, four IBM 3742 dual station devices, and one IBM 3747 diskette-to-tape converter.

1974 projects planned—Major enhancements to payroll, inventory, accounts payable, personnel, freight revenue accounting and simulation systems.

MTA/NYCTA: 1973 projects completed—Conversion to IBM 370 gave centralized data-processing capability for entire MTA; new computer applications included scheduling of police for specific posts.

1973 equipment installed—IBM 360/22 to be used as input to model 370/155. Peripheral equipment installed included two disk drives (IBM 2311); two tape drives (IBM 3420), two printers (IBM 1403) and control equipment.

1974 projects planned—Job assignment and attendance recording; automated personnel data system; improved stores, inventory and accounting system; cost control system.

MILWAUKEE ROAD: 1973 projects completed—Installed a new personnel information system; installed a law case data base and retrieval system for the law department; expanded use of the IBM optical scanner for payroll and traffic systems; conducted extensive research in development of a new budget and responsibility accounting system leading to installation of first phase of this system early in 1974.

1973 equipment installed—Completed changeover to IBM 3420 tape drives; installed Inforex key-to-disk system to replace certain keypunch machines; increased disk capacity on batch-processing computers; installed system 3 model 10 computer at major train yard; installed Four-Phase minicomputer with 20 crt units.

1974 projects planned—Install system 3 computers in second yard; complete installation of budget and responsibility accounting system.

Highlighting '74: Systems development and implementation, plus re-programming

MISSOURI-KANSAS-TEXAS: 1973 projects completed—Installation of front end programmable message switching teleprocessing computer.

MISSOURI PACIFIC: 1973 projects completed—Installed Zone-Track-Spot (ZTS) at 20 locations; implemented yard car-control (YCC) at seven locations; established Customer Service Centers (CSC) at 15 locations with Industry Car Control (ICC) and Standard Terminal Procedures (STP). The Certified Interchange phase of Transportation Control System (TCS) was implemented. Optical character recognition systems were implemented on all districts for collection of payroll data. MP became an official road in the AAR TRAIN reporting system.

In addition, MP installed IBM TCAM telecommunications programs (TCS data is now used for car accounting functions); provided equipment control with batch inventory reports (detail and summary) based on various parameters the car distributor may select; detail program design for Phase 4 of TCS completed; also completed was the TCS communication network design analysis for future phases of TCS.

1973 equipment installed—Two IBM 3705 transmission control units replacing two IBM 2703 units and three IBM 2701 units; upgraded two IBM 370/155 computers from 1.5 million bytes of core storage to two million bytes; installed a Mohawk system for transmission of data to and from the AAR TRAIN system; installed 48 satellite card preparation locations for TCS AUTOBILL, the repetitive waybill phase of TCS; installed PEC PDP 11/40 computers at Memphis and Omaha for the Yard and Terminal System (YATS) phase of TCS.

1974 projects planned—Install two IBM 370/168 computers replacing two IBM 370/155 computers; install the TCS YATS system at Texarkana, Ark., Palestine, Tex., North Little Rock, Ark., and Kansas City; implement TCS-3 AUTOBILL at 42 locations; increase TCS reporting locations from 73 to 129; start program design for Phase 5 of TCS; implement the shipper billing entry phase of AUTOBILL whereby shippers may have direct data entry to TCS-3.

MONTREAL URBAN COMMUNITY TRANSIT COMMISSION: 1973 projects completed—Working on conversion from a DOS to an OS system; also completing transfer to the computer of a manual accounts payable and general voucher system.

1973 equipment installed—IBM 360/50 that is a 384k system with a 1403 N1 printer, a 2540 reader, a 2314 disk drive (8) and a 3420 tape drive (2).

NORFOLK & WESTERN: 1973 projects completed—Roanoke, Va., terminal information control system; on-line car distribution information system; centralized payroll system; and material inventory data collection system (on-line).

1974 projects planned—Equipment history, system; on-line purchase-order writing; car distribution (on-line supply vs demand); payroll procedure modifications; and on-line terminal systems.

ONTARIO NORTHLAND: 1973 projects completed—Computerized financial statements.

1973 equipment installed—Optical mark feature on an IBM MFCM 2560.

ROCK ISLAND: 1973 projects completed—Daily reporting system which gives an account of the status of various activities at major agencies was installed using the teleprocessing system. The traffic reports which utilize the car movement data were redesigned. New audit reports were produced which utilize car-movement data to check on the proper receipt of revenues. The expense system was expanded to include purchase order requests;

purchasing agents thereby gain information on the history and usage of ordered items. Shop payroll data were expanded, giving more information on locomotive repairs and improving internal system controls. A locomotive information system was begun, to produce reports on the maintenance performed on locomotives.

1973 equipment installed—Two system 370/145 computers replaced 2 system 360/50 computers. Also installed were the following: Three IBM 3211 printers, two IBM 3803 tape controls and 12 IBM 3420 magnetic tape units, three IBM 3505 card readers, two IBM 3525 card punches, one IBM 2495 tape cartridge reader, five IBM 1050 data communication systems, two IBM 2740 communication terminals, and one AT&T 83B3 Teletype. Expect to have installed two IBM 3830 storage controls, two IBM 3333 disk storage and controls and four IBM 3330 disk storage devices.

SANTA FE: 1973 activity—Functional accounting system placed in service; service bureau established to handle diversions, clearances and no-bills; aci installed at Los Angeles and Bakersfield, Calif.; mini-computer programmed and installed on track geometry car; system to control work equipment installed; larger-capacity computers installed in three centralized accounting bureaus to assist billing and collection expenses and eliminate card input.

1974 activity planned—Begin programming for the control on the hump yard to be built at Barstow, Calif., provide capability to connect additional communication lines and terminals to the teleprocessing system; develop meaningful service-measurement programs; make provision to provide data for TRAIN II and use data supplied by TRAIN II; expand efforts to provide data base to answer various corporate questions, particularly, by relating operational and financial data; install COM (computer output on microfilm) device in Topeka data center.

SEABOARD COAST LINE: 1973 projects completed—Consolidated Clinchfield data processing into SCL Family Lines System at Jacksonville, Fla., data center; continued expansion of simulation and modeling techniques; expanded computer control of special equipment.

1973 equipment installed—L&N at Louisville installed IBM 370/158 replacing 370/145; SCL at Jacksonville installed eight additional IBM 3330 disk drives.

SOO LINE: 1973 projects—Started data-base management applications for on-line revenue accounting system.

1973 equipment installed—Upgraded all disk drives for IBM 360 to larger size; ordered IBM 370/140, 384K.

SOUTHERN: 1973 projects completed—Information system supporting hump yard process control interface and inventory completed for Sheffield, Ala., Yard; one-system accounting for several subsidiary lines.

1973 equipment installed—At Sheffield Yard, five Data General Nova mini-computers, five Bendix crt's, five Centronic printers, and one line printer; also installed 27 IBM 3270 crt's, five IBM 3284 printers, and two IBM 3286 printers.

SOUTHERN PACIFIC: 1973 projects completed—Additional computer aids to help pinpoint major problem areas and reduce loss-and-damage payment; initial stages of personnel system to aid in identifying qualified employees to fill positions and select training and educational programs; modifications to stockholder record program to provide for dividend reinvestment processing; mechanical updating of information for The Official Railway Equipment Register; a program to convert variable customer name-location spellings to standard displays for more accurate sales and activity reports.

1973 equipment installed—Two TOPS IBM 370/165's being replaced with two IBM 370/168's one MIS IBM 370/155 replaced by one IBM 370/158, IBM 2314 disk storage and 1403 printers replaced with new IBM 3330's and 3211's; a second 14-station Inforex key-to-disk system installed to replace keypunches and verifiers; an Ampex computer output-to-videofile unit installed to expedite the direct filing of computer-generated revenue images on video tape for retrieval purposes.

1974 projects planned—TOPS new application project is car scheduling which will allow for tracking and control of each car throughout its movement on SP lines. Addition to the MIS system, made possible through the real-time capture in the TOPS system of all loaded-car movements, is revenue estimating on a current basis. Implementation in 1974 will allow a more realistic alignment of expenditures with revenues. Will initiate an 18-month pilot project involving the development of a fully-automated train-dispatching system.

TORONTO TRANSIT COMMISSION: 1973 projects completed—Revised system for recording mileage; in-depth job costing and measurement system (equipment department); revised materials, stores issues and purchase-invoice costing system; and signal maintenance schedule.

1974 projects planned—Computer simulation of the subway system, scheduling and run-cutting.

UNION PACIFIC: 1973 projects completed—A component shop inventory and locomotive maintenance system was implemented. This on-line system controls the flow and inventories of the major components between the Omaha repair shop and the remote replacement shops, and also prepares mechanized schedule of work to be performed at the Omaha repair shop. System makes component change-out history information available through on-line inquiry to all replacement shop points. Tele-Communication Access Method (TCAM) line handling software was implemented and is now being used in the COIN system to replace Queued Tele-Communications Access Method (QTAM). On-line direct data entry via crt for keypunching replacement was converted from Version I to Version II. This new version will provide a capacity for more devices and less expensive and higher performance 3270 crt replacements for 2260's.

1973 equipment installed—Two IBM 3705 communications controllers were installed and replaced one 2701 and two 2703 transmission control units. Three IBM System 3 mini-computer systems replaced three IBM 6400 ledger accounting machines. These systems are being used for payment of vendor invoices, preparation of personal expense vouchers and related accounting functions. Two 370/155 main storage upgrades were installed to provide 2-megabyte main storage capacity on each 370/155.

1974 projects planned—A Halon 1301 fire extinguisher system will be installed in the computer center. Installation of diesel generator equipment and necessary electrical work to supply 200 kva backup power supply to the computer center will be accomplished. This will provide electrical power for the operation of the COIN on-line computer during any extended power outages. Implementation of Phase II of the COIN II system (Complete Operating INformation) will begin.

WESTERN PACIFIC: 1973 projects completed—New payroll system designed; new message-switching software package designed; conversion project completed for 1200 programs changed from GE 425 to Burroughs 3500 computer system; design completed for new transportation information processing system.

1973 equipment installed—Two new Honeywell type 716 units, and two new Burroughs type 3500 computers.

New on Union Pacific: COIN II

By Robert D. Bartley
Associate Editor, Railway Age

There's no question but what the computer has now joined such things as tracks and trains on that select list of items that are absolutely essential for running a railroad. From its days as a tool for merely helping figure the weekly payroll, the computer has grown steadily in importance to the point where it is generally recognized that rail managements would cease to be able to successfully manage today's high-capacity rail operations without computerized information networks.

There doesn't appear to be any end to the improvements and refinements that can be made to the already highly-refined information systems serving the railroads today. On Union Pacific, for example, an information system designated COIN (for Complete Operating INformation) was developed in the 1966-69 period that was capable of giving an instant replay on a great deal of activity taking place on the railroad at a given time. Train movements, car locations throughout the UP's 9,500-mile system, destination, departure, arrival, routing and other vital information would come spewing out of COIN upon request. The system was good. It was fast.

Although COIN was good, its developers knew on that day in 1969 when it was finally in full systemwide operation that it was not the ultimate answer. "We knew that we had to gather more information and better information and get it to more people more quickly than ever before," explains J. L. Jorgensen, director of management information services. Thus COIN became a continually changing system. And now, it has changed and been improved enough that UP feels a bigger and better system —COIN II—should be introduced in its place.

COIN II, just now coming on-stream, is a much more comprehensive system than the first version of COIN. It can generate much more timely, accurate and useful information. It will allow UP rail managers to manage better. Unlike COIN, which concentrated heavily on tracking freight cars and keeping tab of their activities, COIN II will also concentrate more heavily on trains and locomotives, tracing their activities at all times. Because of its increased size, the new system will be able to take essentially the same raw information that was available to

COMING ON THIS YEAR, COIN II is described as a heavily-modified and much more comprehensive version of COIN—which was itself a good, fast system.

INCLUDED IN the 150 man-years going into COIN II: A few minutes here with Director-MIS J. L. Jorgensen (right), Paul Sturgeon, manager-computer operations, planning, control (left) and A. K. Eiben, director-EDP operations.

COIN and shape it into a much more valuable information package for management.

Basically, COIN II provides these advantages:

—Additional operating and accounting information.

—Better computer-assisted car distribution procedures.

—Expanded inquiry capability.

—Cost-saving mechanical department applications including maintenance scheduling of both cars and locomotives and component inventory management.

—Expanded train reporting capabilities.

—Expanded TOFC/COFC reporting capabilities.

—A general broadening of the scope of data collection.

Playing an important role in providing COIN II with its increased information-dispensing capability is an IBM 370/155 computer system with front-end 3705 transmission control units. Located in the massive 12-story, $5.5 million addition to UP headquarters in Omaha, Nebr., the computer is assigned solely to the new information system. As an indication of how strongly the UP management has come to depend upon the information generated by COIN, the huge IBM 370 has a twin for a backup which stands ready to take over the duties of the Number One computer should there be a malfunction. Something that the railroad dreads, says Jorgensen, is that one-in-a-million chance that both computers would become inoperative at the same time. "The chances of such a thing happening are very slim, but we know for a fact that it can happen," he adds.

COIN II embraces all the other input/output devices which are essential for the real-time performance of management information systems. Low volume off-line offices, which generally receive more messages than they send out, are outfitted with Model 28 Keyboard-Send-Receive Teletype devices. Elsewhere, Model 35 Automatic-Send-Receive Teletype devices, which have the capabilities of preparing transmissions on paper tape as well as transmission of the edited tape as a separate step, are used.

For input purposes, the cards must be keypunched in a defined format, but any card reading device can be used to transmit the information. The Keyboard Input device is an IBM 1052, which is part of the 1050 complex, and it provides direct keyboard entry, but in card format.

Some 150 man-years of effort were required to establish COIN II. By the time it becomes fully operational—probably sometime in 1975—over 1,400 clerks will have been trained to use it. Furthermore, the 16 PICL (perpetual inventory of car location) systems that have been serving COIN have been expanded to 31 for COIN II. At the end of this year, UP estimates that it will have 257 computer lines and 355 terminals serving COIN II. The fact that COIN had only 162 computer lines and 245 terminals operating in 1971 and 184 lines and 277 terminals in operation last year is a pretty good indication of the tremendous growth being experienced on the UP in the realm of data processing.

A total of 82 COIN input/output locations have been established on the UP system. Another 56 i/o terminal locations are in traffic offices throughout the nation, and there are still another 93 miscellaneous locations with various i/o terminal capabilities.

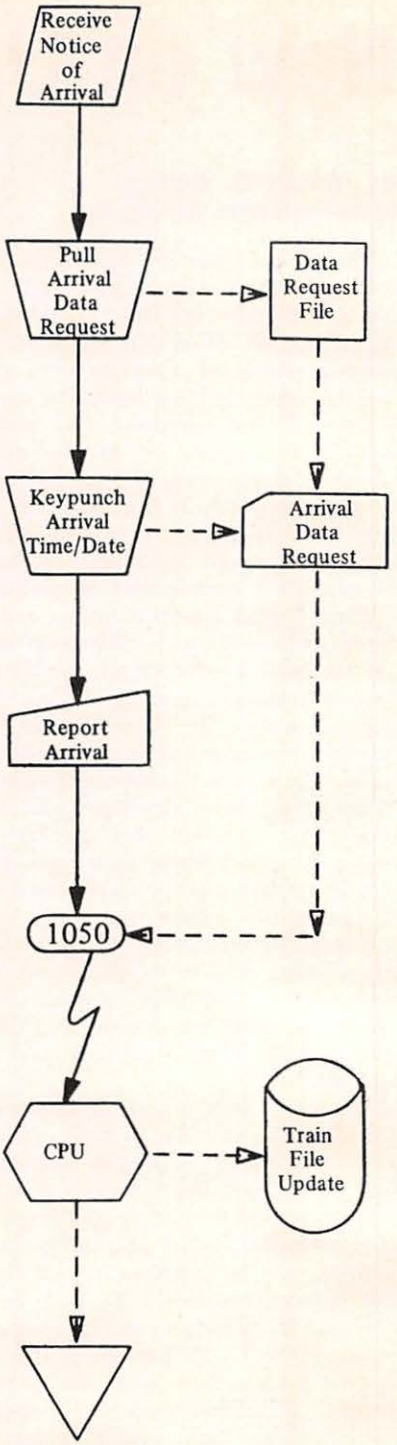
The expanded data collection features of COIN II will go a long way toward aiding UP management to better run the railroad. But, explains Jorgensen, simply having more data than before is not the total answer. "We knew that we needed much better data integrity for the new system so editing programs that validate the data in all entries for proper content are being utilized."

The editing programs check for such things as maximums and minimums, presence of all essential data, proper times and dates, and so forth. The editing process is the watchdog of the system, with the job of seeing to it that all the requirements are met for proper processing of the logic. Actual processing of the logic is in the hands of the COIN II applications program. In this particular segment of the total system the determination is made as to what will be sent and whether the information being sent is both logical and permissable.

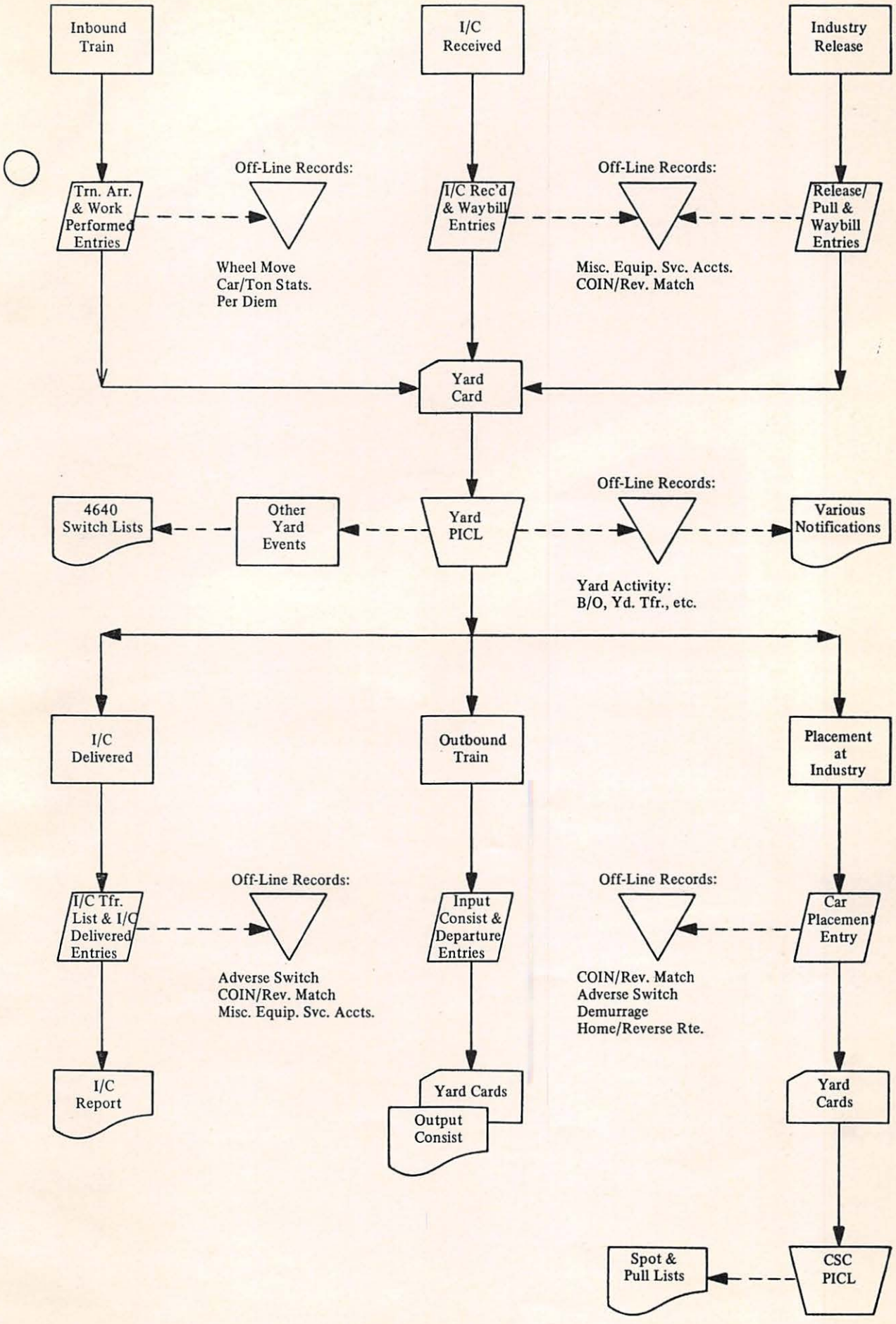
Any system which can maintain a complete biography of every car—domestic or foreign—on UP property at a given time, or know the exact whereabouts of every train, or maintain a medical history of every UP locomotive, has to be somewhat complicated. UP officials recognized at the outset of COIN II's development that a comprehensive systemwide training program would have to be carried out. Such a program has just begun.

Both a highway van and a rail car (an ex-diner) have been outfitted with training aids and furnishings, transforming them into mobile classrooms where field personnel in the farflung reaches of UP territory can be taught the new field procedures of COIN II. The highway van, which can handle a maximum of 16 trainees, is being used at the smaller terminals. Meanwhile, the rail car, with sufficient capacity to han-

(Continued on page 20)



FLOWCHART (right) shows the possible car-movement cycles through a typical UP classification yard. Chart above indicates all the possible data-assembly and processing activities that may take place as an inbound train arrives at a yard (circle, top left of the main flowchart). COIN II will keep a watchful eye on cars throughout the period they are in yards.


Inbound Train
I/C Received
Industry Release
Trn. Arr. & Work Performed Entries
Off-Line Records:
Wheel Move
Car/Ton Stats.
Per Diem
I/C Rec'd & Waybill Entries
Off-Line Records:
Misc. Equip. Svc. Accts.
COIN/Rev. Match
Release/ Pull & Waybill Entries
Yard Card
4640 Switch Lists
Other Yard Events
Yard PICL
Off-Line Records:
Yard Activity:
B/O, Yd. Tfr., etc.
Various Notifications
I/C Delivered
Outbound Train
Placement at Industry
I/C Tfr. List & I/C Delivered Entries
Off-Line Records:
Adverse Switch
COIN/Rev. Match
Misc. Equip. Svc. Accts.
Input Consist & Departure Entries
Off-Line Records:
COIN/Rev. Match
Adverse Switch
Demurrage
Home/Reverse Rte.
Car Placement Entry
I/C Report
Yard Cards
Output Consist
Yard Cards
Spot & Pull Lists
CSC PICL

Innovative design created in the Brooklyn Bridge
a timeless structure as serviceable today as when it was opened
ninety years ago. Equally innovative designs maintain
Kerite's unique reputation for insulated electrical cables
that stand the test of time under the most demanding service
and installation conditions. Specify Kerite...the cable that lasts...
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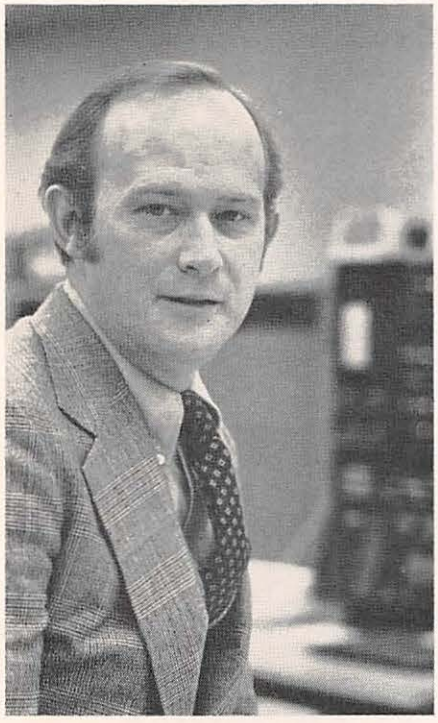


HEART OF COIN and COIN II is UP's computer center at Omaha. Implementation of COIN II will start in the West and work east, and, in fact, startup has already taken place in Los Angeles.

FOR FIVE YEARS, Union Pacific has had COIN, and now it's getting COIN II. Is there a COIN III and maybe even a COIN IV in the future? J. L. Jorgensen, director of management information services, would say possibly and maybe probably. Chances are good, he believes, that "by early 1975 we'll be seeing computer-to-computer talk in our industry." UP computers and those of TRAIN II, he predicts, will be able to communicate with each other directly—"and then we'll see far better car distribution than was ever thought possible." Jorgensen, whose career has been all-UP, has been director of management information services since 1969.

(Continued from page 16)

dle 35 trainees, will go to the larger terminals.

COIN II will actually be phased in over a period of 53 weeks. The phasing in will be coordinated with the training sessions and will be accomplished in 16 steps, starting in Los Angeles and then moving east. During the period that the new information system is coming in, COIN will still be operable, too, in order to handle those yards not yet converted to COIN II procedures. UP estimates that by early 1975, the older COIN can be retired.

Extensive testing of COIN II has been done before it works its way across the UP system. No major problems are anticipated, Jorgensen feels, because "we already know that the software for COIN has been able to work very well for us, and the five years of experience with it will help us with COIN II. We have also successfully implemented the use of IBM's Telecommunications Access Method (TCAM) software, which makes our teleprocessing support and message switching much more reliable."

For COIN II to work effectively with other systems and for it to be of a benefit to UP's operating, traffic and accounting departments, the data on car and train activity must be captured as rapidly as possible at that point where much of the action is taking place—in the yards. COIN II is, in fact, heavily dependent upon data generated in these offices, and this new system has far more data "sources" than were developed for its predecessor, COIN. Unquestionably, one of the key reasons that COIN II will be more valuable to UP management is the fact that more control will be exercised over the posting of events in the field. In addition, UP will have complete data exchange capability with other TOPS-using railroads.

The system works in such a way that virtually no action involving the movement of a freight car escapes entry in the headquarters computer. For example, as a train is received in interchange, detailed information on its status begins immediately to filter into the computer system. An interchange received header card is keypunched to indicate who delivered the cars in the train and when. This information is sent via the 1050 system or a Teleprinter directly to the Central Processing Unit (CPU). Also, if a new load is released from an industry or is received in an inbound train from a non-reporting station, a reporting will be entered into the 1050.

As the car continues on toward its destination or toward another interchange point, COIN II is maintaining an up-to-the-minute report of its movement. Because of the vast number of reporting points and the double-checking that's going on constantly, it will be more difficult for a car to escape surveillance by the computer system.

Although COIN II represents probably one of the most advanced information gathering and dispensing systems in existence today, Jorgensen feels that even greater technical strides can and will be made in the not too distant future. For example, studies are already under way to expand the system so that it will be capable of providing UP management with even more administrative and accounting data which will permit even better management of the railroad.

What all this means is that, even while MIS personnel are working to bring the new COIN II system into full operation over the next several months, events will be taking place which may in fact lead someday to the introduction of COIN III. Jorgensen doesn't discount such a possibility. "I think the chances are very good that by early 1975 we'll be seeing computer-to-computer talk in our industry," he predicts. "I feel certain that Union Pacific's computers and TRAIN II, the national freight car information network, will someday be able to talk with each other directly, and then we'll see far better car distribution than was ever thought possible."

Coming up: World computer sessions

Once every four years or so, experts in rail computer applications from around the world get together to trade notes on the latest applications of the computer science.

This year, it will be the fourth International Symposium on Railroad Cybernetics. The dates: April 21-26. The place: Washington, D.C.

Predictably, with the symposium scheduled (for the first time) for the U.S., U.S. railroad men will be heavy contributors, with close to 20 individual presentations on the program.

Papers will cover such broad fields as freight-traffic management, systems applications in operations, technical and human aspects in cybernetics.

Specifically, presentations will deal with such problems as development of systems for motive-power maintenance, for analyzing profitability, for car-reporting and billing, for determining various operating and physical-plant configurations.

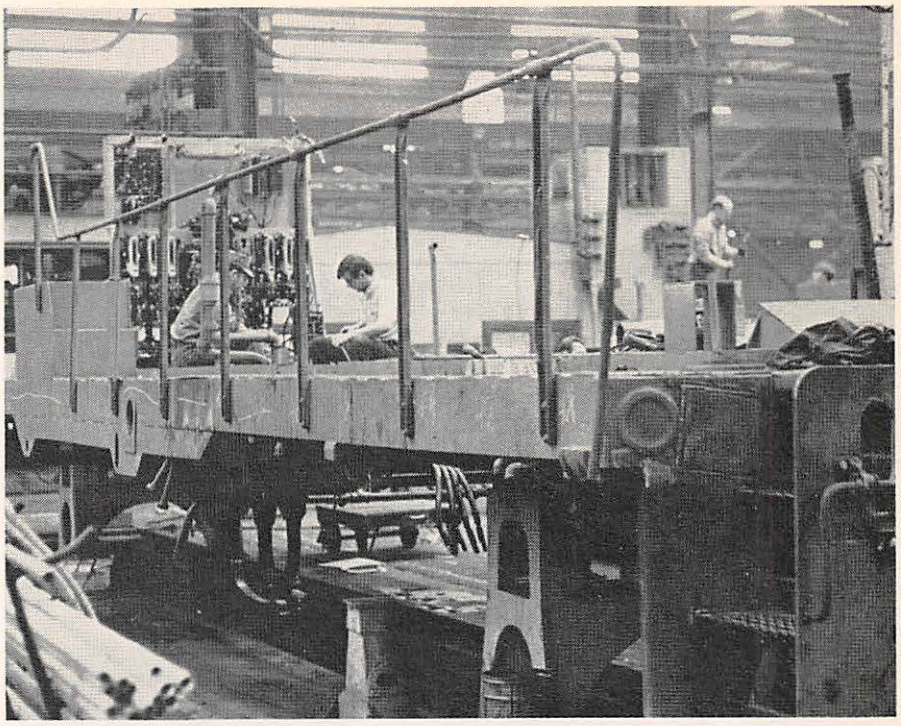
Computers at work:

Managing power . . . . . ▸

Measuring profit **24**

Combining tasks **25**

Planning plant **26**



MOTIVE-POWER shop scheduling and maintenance has long been a problem in forecasting and reporting—but computer-based systems are enabling Illinois Central Gulf to come up with specifics on when, why and what.

MACS helps ICG on power performance

Illinois Central Gulf is getting a lot better handle on locomotive performance—on a fleet numbering well over 1,000 units—thanks to the continuing development of a computer-based Motive Power Accounting and Characteristics System (MACS).

Planning and implementation of the system has been underway for several years and, in fact, further refinements are still being made, especially in the area of time-sharing.

As set up, ICG's major locomotive maintenance facilities can draw upon the system for such information on specific units as:

—Type and date of the next required Federal inspection, along with data on the most recent inspection and on the maintenance cycle and assigned shop.

—Details on the last 15 shoppings of a unit, including specifics on failed components and corrective action taken.

—Details on the last six lube-oil laboratory analyses, including both physical and spectrographic analysis.

—Data on tests, on modifications due and on certain other specs which may occasionally be changed (traction-motor/gear ratios, for example).

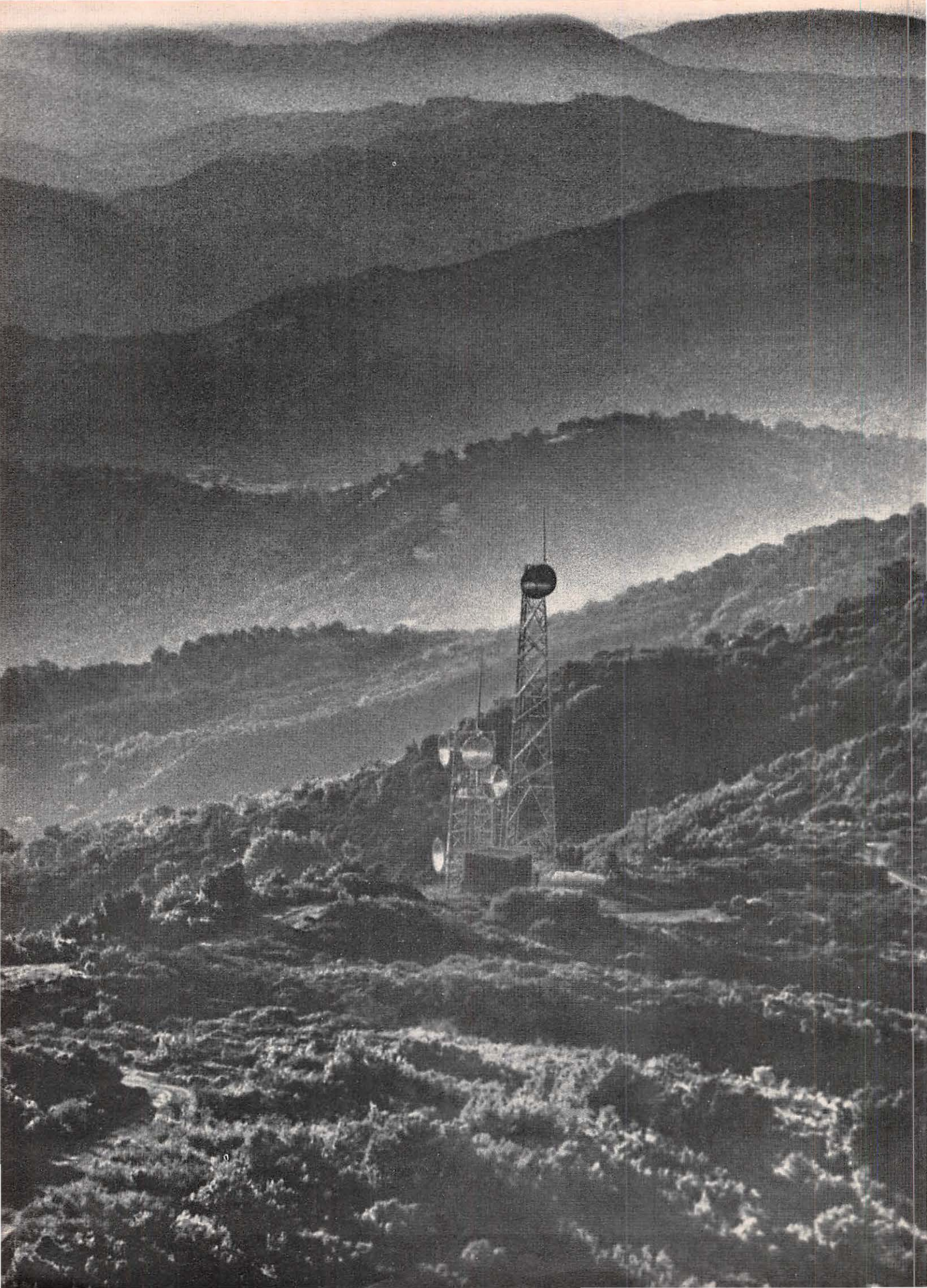
—Data on the most recent change of all major components.

How is the system working? J. J. Boline, ICG systems analyst, sums it up succinctly: The total MACS system is being used with effect as a problem-solving tool in a number of areas of preventive maintenance.

Actually, MACS is a lot more than just an on-line system benefiting shop managers and top management. Considered in its entirety, it's a batch-processing system which produces a variety of reports—some daily, some weekly, some monthly and on-request—which give ICG management a firm grip on various aspects of locomotive performance and maintenance and shop efficiency. For instance, reports on failed components, repetitive failures and major-component failures make it possible to predict what service life can be expected for the various locomotive models in the fleet. An operating-statistics report shows current operating performance of any model, with detail as to such elements as cost per mile and average cost per unit.

The basic source document for the total system is a unit work report, in-

(Continued on page 24)

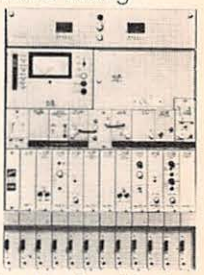


We have a compact, reliable microwave system that fits very nicely in the middle of nowhere.

It's a combination of two GTE Lenkurt systems—the 36A Radio Multiplex and the 78F2 2-GHz Microwave Radio.

Together, they give you the size and reliability needed for voice and data transmission at remote locations for railroads.

A 12-channel system, both multiplex and radio, takes less than 23″ on a standard 19″ equipment rack. So chances are good it'll fit easily in existing facilities along the line.



Specifically, the 36A multiplex has been designed for light route service. It's expandable in single channel increments up to 72 channels. And, up to 192 channels using supergroup equipment.

All channel units are identical, with the frequency determined by a plug-in oscillator. This allows a considerable savings in spare-parts inventory—instead of complete channel units for each operating channel, you only need a single channel unit and a spare plug-in oscillator for each operating channel.

The 78F2 radio provides pushbutton metering on the front panel for fast, simple routine maintenance and fault location—even to individual subassemblies. And all routine maintenance can be done without interrupting service.

Together, the 36A and 78F2 make a compact, reliable system, anywhere and everywhere.

To find out more, write GTE Lenkurt, Microwave Systems, 1105 County Road, San Carlos, CA 94070.

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Circle 7 on Reader Service Card.

(Continued from page 21)

cluding all items of maintenance, inspection, repair, component change, accident damage. This report is generated each time a unit is shopped. Close to 50 shop points contribute these reports, which are completed when a unit is returned to service, mailed to Chicago and entered into the system after edit. Currently, input averages between 150 and 200 reports on each working day.

Development of third-generation computers made it possible to get MACS working on the former IC and, actually, the MACS file was piggybacked on the then-existing car-location file. By mid-summer 1971, the first shop points on IC were getting terminals which provided the capability to query the system. As Boline points out, however, a problem with development of a major system such as MACS is cost, and another problem is time required. So, early last year, ICG decided to look into time-sharing—at first with an outside time-sharing vendor and later with its own time-sharing option available in-house for a number of users.

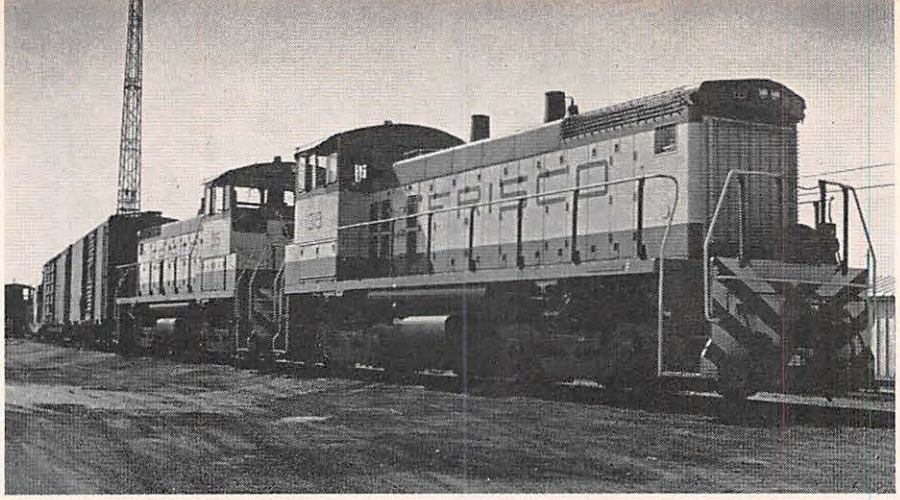
So far as the mechanical department is concerned, time-sharing is being used in summarizing lab lube-oil analyses, so that management can quickly see what locomotive models are having the most difficulties with contaminated oil and what models are having the highest wear rates on components. Another time-sharing report gives data on road failures for all classes of locomotive, and breaks failures down by 50 major causes. Thus, management can see at a glance not only which specific models are causing the most problems, but also why the road failures are being experienced.

Through a couple of statistical software packages, ICG has been able to develop quite accurate rates of failure on a number of locomotive and engine components, with use of the MACS data base.

As Boline sees it, time-sharing has been a comparatively inexpensive and efficient means to quickly put up or enhance a system, where such has been needed. The outlook for this year is for use of time-sharing to a larger extent and in more sophisticated fashion.

From a hardware standpoint, support for MACS is an IBM 370/155 with 3330 disk on-line storage. Line supervision may access the file through use of Western Union Telex terminals, Model 32ASR teleprinters.

A number of measures could probably be used to describe the importance of the system to ICG. Boline cites one highly significant one: ICG's locomotive availability has been averaging better than 89%—and that's one of the highest availability figures in the industry.



ANOTHER CAR, another couple of cars—and how profitable are they? With the help of computer-based PAT, Frisco knows what each car and trailer means.

Is it profitable? Frisco's finding out

In so many aspects of railroading today, no question is as important as this simple one: What's it cost?

So often in the past, however, railroads have either lacked all the pertinent data, or they've been unable to bring it all together in meaningful fashion. One result has been the forced-use of averages and generalities. Profitability on specific traffic, specific movements, has been extremely difficult to pinpoint. Thus, managements have had to agonize over decisions in such areas as pricing, changing operating patterns and practices, acquiring and assigning equipment, determining divisions, going after new business, abandoning operations and lines.

Aided by computer technology, railroads have been attacking this problem in a number of ways. On Frisco, the attack is called PAT—for Profitability Analysis of Traffic, a system which makes use of revenue data from the road's revenue accounting system, operating and equipment data from the management information and control system, equipment use and cost data from the equipment accounting system and cost data from the cost accounting system.

PAT starts with a match-up of each MICS waybill record with the revenue-accounting record for each car and trailer, and the insertion of total revenue and Frisco revenue on the waybill record. (Where no match can be made, as sometimes happens, both unmatched records are sorted and a revenue insertion is made, actually in these cases an estimate based on actual revenues from similar movements.)

In the actual costing, Frisco eliminates most of the uncertainty involved in conventional costing through use of MICS records which cover complete records of all car/trailer activities while the cars and trailers are online. R. D. Bacon, director-cost accounting and statistics, points out, for example, that for each load handled the road knows the type of vehicle, applicable per-diem rates, empty turnaround ratio, turnaround in days, actual loaded miles, type of train movement, locations where switching took place, and weight of car and lading.

Each month, Frisco individually costs all loads—those originated and those received from connections. First, equipment costs are determined—essentially by using the same basic logic used in making car-hire settlements with other roads and private owners. In this, online days involved are calculated from activity records, as are online miles; these figures are then multiplied by time and mileage rates to determine Frisco liability. (Empty car days and miles before and after the load being costed are assigned 50% each to the load and 50% to the preceding/following loads, except that they're assigned totally to the load in the event there was no prior and/or following loaded movement on Frisco for three-month periods preceding and/or following the loaded movement being costed.)

Linehaul and terminal costs are then applied. Move records for each linehaul move generate a cost application covering T&E crew costs, locomotive and fuel costs and M/W costs. From movement data plus car tare weight and net weight of contents, gross ton-miles are calculated for each subdivision over which the load moved. The computer then applies the right unit costs per

gross ton-mile, covering crews, power and M/W. Unit costs are applied for through and/or local trains; empty movement costs are assigned in the same fashion as empty car costs.

As for terminal costs, activity records of placements and releases show a number identifying specific industries, and the computer accesses a cost table to determine the specific cost—determined through field switching and local-train studies—for the industry or industrial zone involved in the move. Interchange costs are also applied through individual road and interchange point, with field studies again having been used to determine these specific costs. Finally, activity records also yield cost data on such items as car-cleaning, clerical work, trailer ramping and de-ramping, drayage.

After the costing process is completed, data developed is retained for two years in addition to the current year. A few reports are produced on schedule—but in designing the system, Frisco tried to make it flexible.

In initiating a profitability-analysis inquiry, the inquirer prepares a form describing the traffic in question, a card is punched and a weekly program takes the cards and provides the data requested—which may be defined extremely broadly or extremely narrowly. Traffic may be defined upon any combination of fields: Accounting source, system origin and/or destination stations, commodity number, equipment-type code, interchange road received from and/or delivered to, billing road, destination road, plan number on TOFC, origin and/or destination city and/or state, marketing manager involved, and, of course, shipper and/or consignee.

The printout, Bacon notes, will describe the traffic, give volume figures on actual moves via Frisco, provide revenue figures and break down variable costs by type of cost. The inquirer also gets online car or trailer days and miles, with a breakdown dividing the figures among three categories, loaded, empty and under-control-of-patrons.

Frisco regards the retrieval capability as virtually unlimited. In addition, there are several scheduled reports—designed to provide periodic checks on over-all profitability. Quarterly reports are prepared on the road's most-profitable and least-profitable traffic; annual reports are cranked out on high-volume movements and on all traffic on a classified-by-commodity basis.

What are the uses of PAT? Obviously, output is used as Frisco works on pricing decisions. It's also brought into play in analyses of equipment utilization and profitability, and in preparing material to meet requirements involved in various regulatory proceedings.

One system does two jobs for Penn Central

Can one system solve data-gathering and -handling problems which are (1) business-oriented and (2) transportation-oriented? Penn Central thinks it can—through TABS, for transportation and billing system, a design worked out to satisfy requirements both for car reporting and for the billing of customers.

PC has taken a component approach to system design, with four main components:

—On-line, intelligent data terminals in the field.

—A private-line communications network which is high-speed and dedicated.

—Stand-alone communication computers.

—Realtime application processing computers.

Consider first the problem in the field—where system development requires use of a data-gathering device with preparatory processing capability for both transportation and waybill messages. In general, most roads have some form of online, realtime car-reporting system, and a number are working with online, computer-prepared waybills. In general, however, the terminal devices in the field are separate—while Penn Central's TABS design requires that the field terminal support four functions: Reporting of car movements, waybill preparation and reporting, local yard reporting and tracing. Local yard reporting is a stand-alone function, but the other three demand that the terminal be online with direct access to computer files.

In the case of a transportation message, explains M. D. Sims, assistant vice president-systems development, editing of communications and transaction codes and analysis of indicative fields is handled within the terminal. When program logic is satisfied (or after correction is made if an error is detected), the message is automatically sent to the headquarters computer. It's also simultaneously printed—as advance consist, wheel report or switch list, for example—on a stand-alone printer. After extensive edit in the computer, the originating terminal gets an acknowledgement and the message is switched to a receiving location as required. (Minor errors discovered in the mandatory edits are reported to the origin terminal to encourage correction and are indicated in the message to the receiving location where they must be corrected before any re-transmission; if mandatory edits are not satisfied, the entire message is rejected and the origin terminal must correct the errors and retransmit.)

As Sims sees it, the thing that distinguishes TABS from other data-gathering systems is its dedication to getting a one-time, error-free data capture of all waybill information for use in all further computer processing. If this is to be successful, however, waybill information has to be edited when it's mechanically recorded or within a matter of minutes after data capture. And, says Sims, PC has developed the capability for preparing the waybill, getting the one-time data capture and providing online editing—without requiring use of an economically-staggering communications network and/or computer facility.

In studies of waybills, PC computers identified something approaching 25,000 movements on the railroad which are repetitive in nature—defined as same-shipment moves at least 24 times a year, same-shipper, same-consignee, same origin and destination.

In repetitive-move waybill preparation, a specific-move identifying code is entered at the field terminal, the computer searches its file and when it finds a match the full waybill information is sent back to the terminal, which then prints on the waybill this fixed information while the operator enters car initial and number, bill date and number, weight and charges.

The variable information, along with waybill code, goes back to the computer, necessary verifications and correlations are made and error-correction procedures are instituted if necessary.

(Terminals also must have capability for preparation of waybills in a stand-alone environment—open waybilling—in which terminal logic guides the operation in preparing the bill, the terminal edits mandatory items and then transmits the waybill to the computer for extensive audit which requires use of a special program.)

Normally, redundant capture of waybill information occurs first in the preparation of a transportation message covering car movement. In TABS, however, a transportation message is created automatically and simultaneous with preparation of the waybill. Thus, one possibility for human error in transcribing is eliminated, and the message

cards produced are then used as car-detail lines in transportation messages.

In the third function demanded of TABS, local yard reporting, design criteria requires that terminals have software capabilities for handling electronic accounting machine logic and input/output capabilities of the machines' hardware, so that machines previously installed could be released.

Finally, Sims notes, TABS has capability to handle tracing functions—to help yards in clearing up no-bills, determining foreign-line equipment home routes, getting instructions on handling pool equipment and so forth.

In setting up the communications capability for the system, PC had, of course, to have a means to support the reporting of an activity in a time-frame which takes into account the effect of the activity on operations. It also had to have a design in which (1) field-originated messages were computer-edited and errors transmitted back to origin point for correction before basic source documents had gone from the origin work-point for further processing, and (2) field-originated transportation messages went through computer edit and data enhancement before re-transmittal to a receiving location.

There were also other factors. One was that PC is a terminal-intensive railroad, with a relatively large number of yard- and interchange-related messages which must be processed on a timely basis. A second was that waybill preparation is more a batch-type activity, involving relatively long messages but handled normally as a scheduled activity with more-or-less predictable volumes to be handled in peak time periods.

Analysis of most-critical demands for each type of message determined the requirements for a single data circuit. What PC came up with was a data communications network with more than 112,000 miles of data circuits, more than 1,000 terminals (more than half of which operate at speeds of at least 2,400 baud), data sets which permit high-speed transmission on ordinary telephone lines without special conditioning, and a control facility which makes use of a minicomputer to monitor circuits and data sets and terminals to insure integrity of transmission.

The third major component of the system, the stand-alone communications computers, have but one function: To handle message-switching between field terminals and the headquarters computers; they're not involved with the content of messages but rather with data transfer within the timeframe required for timely accomplishment of activities involved in operations.

Finally, in transportation and waybill processing, software and application programs are highly modularized, with major elements coming from IBM and CINCOM Inc. and written by PC itself.

As Sims sums it up, TABS really is an integrated system: A car movement can't take place without the system looking for a waybill that describes the move—and a waybill can't be prepared without the system looking for a car movement as described by the waybill. This kind of logic eliminates duplicate customer billing (as well as no billing at all). It also provides for certain checks and balances in transportation activities. And it provides positive acknowledgement of services-completed; this results in the producing of a freight bill by the computer, and this capability alone can cut about five days from the normal cycle required to produce a bill.

With complete waybill information on services-rendered each day, Sims points out, there is the capability for determining a number of measures.

Simulation helps plan the plant

If you're running what is basically a single-track railroad, and your passing tracks aren't in the right places to match up with your patterns of traffic, then you've got trouble. Over the years, most roads have made decisions related to passing tracks mostly by a combination of experience and intuition. But, a few years ago, Frisco decided that there ought to be a more scientific way to go about things—and the train-meet calculator is the result.

As L. A. Thomas, director-operations planning, describes it, the computer simulation model gives Frisco "the ability to weigh alternatives and to predict the probable consequences of decisions more precisely in the operations planning of a single-track railroad concerning operating policy and procedures and physical plant."

Since it first came into more than experimental use, the most extensive application of the model has been in the analysis of heavy-tonnage mainlines as to passing track locations and lengths. Frisco's goal, Thomas notes, "is to have a truly balanced passing track system, from a standpoint of running time, for optimum operation. In working toward this end, we are now better able to set priorities."

Over-all, Thomas points out, all decisions concerning passing track placement and length, train schedules, priorities, motive power requirements and train configurations can be based on analysis of the output of the model.

Frisco had a couple of problems in developing the model. One concerned the human element, and the fact that a communications gap can easily develop between technical staff people and line operating personnel. Frisco determined that line operating people would be in on development of the model from the start. In addition, the technical people have also emphasized from the start that the program "is an added tool for management and does not replace nor ignore the expertise of experienced operating personnel."

A second problem was more technical in nature: Frisco obviously wanted to incorporate all needed data, including dispatcher's logic, while at the same time keeping the program small enough to be run on an IBM 360/50. This, Thomas believes, has been done—and by doing it that way and through use of computer time that would otherwise have gone unused, costs have been minimized.

Input for the calculator is on IBM cards containing formatted information defining:

—Division to be studied, by stating "to" and "from" stations and intermediate points.

—Sets of plus and minus factors to be randomly selected and applied to train starting times, so as to approximate late and early departures from terminals.

—Sets of delay times, also to be randomly selected and applied at and between passing tracks, so as to approximate delays on the division.

—Sets of delay probability at passing tracks and between them, to be randomly selected to see if delay time should be applied.

—The set of trains to be run over the division. This definition will include train identification and priority, direction of travel, frequency, start-time, an indicator for plus-or-minus set to apply to start-time, and run-time increments developed from Frisco's train performance calculator.

—A variety of division data for each location. This will include such elements as indicators stating if the train fits the passing track, if there's a power switch at the entrance to the track, and whether the terrain is favorable for

stopping a particular train at a particular track.

—The number of cycles the input data is to be processed for a particular run.

—Scheduled departure and arrival times and origin and terminal points for all trains.

—Priority-time combinations to be used in meet situations to determine which train to hold at what point, and in pass situations to determine if a pass is required.

Processing involves use of a clock concept, by which the time interval from the starting time of the earliest train to the arrival time of the latest train of the run can be stepped through one minute at a time. In the model, meet conflict is resolved by considering possible meet times together with priorities of the trains and then selecting the best passing track for the meet. Once this selection is made, then fit, power-switch and terrain factors are considered to determine if the first-arriving train should head in or be held online for the meet. Pass conflict is resolved by considering priorities. If a higher-priority train is in front, the following train is rescheduled to run a set number of minutes behind for the rest of the run. If a lower-priority train is in front, it's headed into the last passing track prior to catch-up time and then rescheduled a certain number of minutes behind the departure time of the passing train.

Outputs which can be developed include records which permit printing of a graph similar to a ctc graph on which points representing train movement can be produced; as well as a number of significant statistics applying to trains and to locations.

Within reasonable operating limits, Thomas says, a passing track's importance can be based on two factors: (1) Its use, or its projected use if it were of adequate length, and (2) running times to alternative meeting points.

Through simulation, use can be determined or increased use can be calculated if track length is extended or if a new track is built. Combining a number of known quantities yields an intensity rating for a track and compiling intensity points for a series of tracks or locations produces an intensity curve for the mileage under consideration.

All of these calculations may point to a need for reducing intensity at a given point. But, Thomas concludes, "It should be emphasized that this reduction may or may not be accomplished by extending an existing long passing track at the high-intensity point. The construction of an entirely new track or the extension of an adjacent short siding frequently offers the best and/or only solution."

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RCA Industrial Products

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RSC People

ATLANTIC RESEARCH CORP.: **William A. Shand** appointed marketing manager for the ARCOM Mobile Digital Data Communication System.

COLLINS RADIO CO.: Myron F. Wilson, corporate vice president of manufacturing, also named vice president, operations, **Microwave Division,** to replace **J. E. Cerny,** resigned.

DATA GENERAL CORP.: **Carl D. Carman** appointed director of engineering. He was formerly technical assistant to the president, **Storage Technology Corp.,** Boulder, Colo.

FEDERAL SIGN & SIGNAL CORP.: **Raymond E. Deasy** named corporate director of planning. He was formerly director of sales and marketing, **Western-Cullen Division.**

FLORIDA EAST COAST: **H. E. Lawrence** appointed assistant signal supervisor with responsibility for Signal Gang No. 3. **Birley Giddens, Jr.** named assistant signal inspector, Melbourne, Fla.

INTERNATIONAL COMMUNICATIONS CORP.: **Sang Whang,** vice president and technical director, named senior vice president and technical director. **Thomas P. Goslin,** director of engineering, advanced to assistant vice president.

LOUISVILLE & NASHVILLE: Effective Jan. 1, the Signal Department reorganized. **D. L. Webb** appointed signal engineer-planning and design; **H. L. Hood,** signal engineer-maintenance and construction; **C. E. Shaw,** manager-signal services; **R. H. Brandt,** manager-planning and budget; **J. D. Atchison,** assistant signal engineer-design; **R. W. Gorham,** assistant signal engineer-Northern Region; **J. B. Carpenter,** assistant signal engineer-Southern Region; **L. B. Grant,** supervisor-signal standards and training; **J. P. Bishop,** supervisor-planning and budget; **J. T. Brown,** supervisor-electronics; **C. C. Rankin,** supervisor-maintenance-Northern Region; **G. L. Tanner,** supervisor-maintenance-Southern Region; **R. H. Bruce,** supervisor-construction-Northern Region; **H. M. Reeder,** supervisor-construction-Southern Region; **F. G. Garrett,** office engineer.

McGRAW-EDISON CO.: **Robert J. Doyle** named plant manager for the **Edison Battery Division's** new electronics plant, Erie, Pa. **Peter C. Bradshaw**

R. E. Deasy
FS&S

R. W. Coiner
WAB

appointed manager of sales engineering for the division, Bloomfield, N.J.

NORTHERN TELCOM, INC.: **Eugene J. Doody,** director of personnel, elected vice president-personnel.

OKONITE CO.: **Robert M. Bowman** named sales representative, Chicago district.

THOMAS K. DYER, INC.: **Richard B. Whalen** named vice president.

WABCO: **Ronald W. Coiner** appointed manager-mass transit engineering, **Westinghouse Air Brake Division,** Wilmerding, Pa. **George W. Slusser** named manager-purchasing for the division.

RSC Publications

Two-way radio equipment for a transit communication system is covered in a new publication by GE's Mobile Radio Department. *General Electric, Communication Systems Division. Circle 115 on Reader Service Card.*

A 12-page, color brochure, Visual Communications, describes equipment for closed circuit television as well as CCTV accessories. *Motorola Communications and Electronics, Inc. Circle 116 on Reader Service Card.*

A 28-page, illustrated booklet, GRS Capabilities in Transportation Control, covers the services offered. Information on research, engineering, production, installation, service and marketing is included. *General Railway Signal Co. Circle 117 on Reader Service Card.*

A 14-page color brochure, Extensions of Control For Transit Systems, describes new communications equipment applications for the mass transit industry. *Motorola Communications and Electronics, Inc. Circle 118 on Reader Service Card.*

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Progress in electronic hot box detector systems

The "Decision-Maker" Universal Alarm System brings the state-of-the-art in hot box detection to a new high level. And that's just what you'd expect from the No. 1 company in the field—Servo, the industry's pioneer designer and leading producer.

Since 1957, more than 1,800 SERVOSAFE Hot Box Detective Systems have been put into service world-wide, and have compiled an unequaled record of safety improvement, more efficient preventive maintenance procedures and cost reduction.

Hot box detectors available from Servo offer the widest flexibility in choice of system configuration, features and functional options. With our broad range of products and world-traveling network of field engineers, we can readily "customize" the design, manufacture, installation and operation of a SERVOSAFE System to best meet the particular requirements of your railroad.

You are invited to contact us for complete descriptive literature, or to arrange a field engineering site survey and application review—without obligation, of course.

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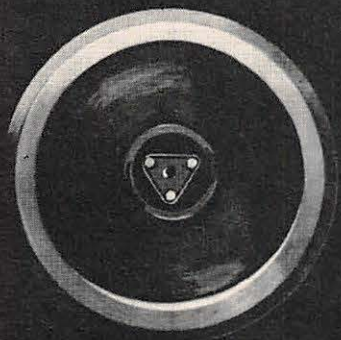
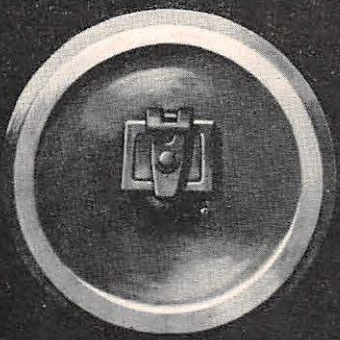
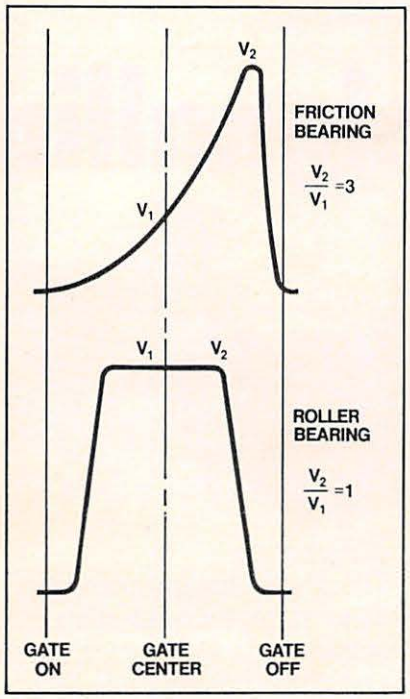
bearing has the hot box? the "Decision-Maker" knows!





Servo's new Universal Alarm System with automatic bearing identification*

The heart of our new Universal Alarm System is a unique bearing identification circuit known as "SWAT"—Split Waveform Analysis Technique. Because of their different heat transfer characteristics, roller and friction bearings produce different heat radiation "signatures" during the detector scan period. The SWAT circuit splits the gate scan period and compares V_1 with V_2. Typically, friction bearings produce a V_2/V_1 ratio of approximately 3, and roller bearings produce a ratio of approximately 1. The ratio sensed by the system is utilized to identify the type of bearing being scanned.



The "Decision-Maker" Universal Alarm is much more than the latest development in SERVOSAFE® Hot Box Detective™ Systems. It's a whole new concept designed to solve one of the toughest problems in hot box detection: **the difference in heat level characteristics between roller bearings and friction bearings.** The fact that normally-operating roller bearings run hotter than friction bearings has always presented a serious dilemma to railroad engineers. If you employ a low level alarm setting for early detection of overheated friction bearings, you run into the problem of too many false alarms on roller bearings. A higher setting to be consistent with roller bearings is not recommended as it can result in overheated friction bearings that pass by undetected.

Now, you don't have to make that difficult decision. Our new "Decision-Maker" Universal Alarm System will make it for you. It provides individually adjustable differential and absolute alarm levels for each type of bearing. It automatically distinguishes between roller and friction bearings, applies the proper alarm level, and actually makes the decision as to whether or not a hot box condition exists.

The Universal Alarm is available on new installations or as retrofit equipment for all existing models of SERVOSAFE Hot Box Detective Systems. If you'd like to put an end to the roller bearing vs. friction bearing problem, let us put the "Decision-Maker" to work on your railroad. Write or phone today for complete information.

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RSC Product News

Transceiver

The CCL Type 100E Selective Baseband Transceiver is designed to eliminate noise and carrier interference to two-way order-wire communication. The battery-operated device can be used with 600- or 900-ohm open-wire or cable facilities. The unit is housed in a moisture-proof, heavy-gauge steel case which has a carrying strap and detachable battery pack. *Calgary Controls Ltd. Circle 101 on Reader Service Card.*

Calculator

The HP-65 fully-programmable pocket calculator is designed to handle arithmetic, logarithmic, trigonometric and exponential functions. It has 51 preprogrammed functions and operations, four-register operational memory stack, nine addressable memory registers, a 100-step program memory, built-in magnetic program card reader/writer, five user-definable keys, full program editing capability, conditional or unconditional branching, and can show logic comparisons. There is a 200-decade operating range (10^{-99} to 10^{99}). LED display shows 10-digit mantissa and two-digit exponent plus signs. Full display formating, a rechargeable Ni-Cad battery pack, prerecorded program cards and a users' library are also featured. *Hewlett-Packard Co. Circle 102 on Reader Service Card.*

Wattmeter

The model 4371 THRULINE Directional High-Power Wattmeter is a digital insertion instrument to measure forward or reflected CW power in coaxial transmission lines. It can accurately measure power flow under any load condition from 25 to 520 MHz and from one to 1,000 watts in six ranges, according to the manufacturer. Insertion VSWR in 50-ohm systems is 1.1 and accuracy is said to be ±5% OFS. The user can calibrate the instrument to known RF power standards. Finish is gold vinyl jute with a dark non-glare front panel. *Bird Electronic Corp. Circle 103 on Reader Service Card.*

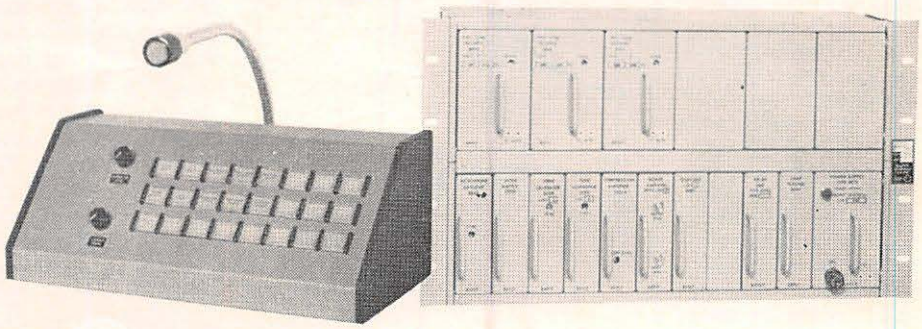
Steel crossings

Timber, asphalt and concrete at rail/highway grade crossings can be replaced with Steelplank, which is said to be virtually maintenance-free and give excellent traction. The rail crossing consists of steel channel-shaped members which run on top of the ties. Channel-shaped steel planks are welded to these at right angles to the ties. Panels, which are 6½ feet long, are designed to cover an area of five standard tie spacings. *Steelplank Corp. Circle 104 on Reader Service Card.*

Tester kit

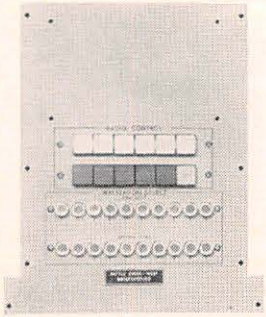
The Maintenance Tester Kit Model 615-K provides a multi-purpose, multi-range tester and accessories for maintenance tasks, including trouble-shooting circuits, thermo-couples, cooling and heating equipment, and controls and machinery. The kit, which is contained in a black molded carrying case, includes the Model 615 V-O-M to measure volts, ohms, ac current leakage,

Dispatchers' signalling system



Available in console or as a custom panel to fit existing equipment. The Bayly Dispatchers' Signalling System, is employed in railway and pipeline operations to provide fast and reliable signalling and voice communications between dispatchers and mobile or fixed station operators in directing and supervising from central control stations.

This low cost system operates on radio, cable or open wire lines, using two or four wire voice circuits. Signalling is accomplished by using single and multi-digit codes. Each code is made up of a dual tone combination which is momentarily present on the line. This technique permits signalling and voice communication to be carried on at the same time, in the same frequency band, without interaction or disturbance.



The system equipment is very compact and entirely solid state, incorporating the latest technological advances in electronics. The modular, printed circuit board construction technique is used throughout, assuring flexibility of operation and ease of maintenance.

Write or call for more information.

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ACmA temperature and thermocouples; the model 20-A Clamp-on ac ammeter adapter; the Model 101 ac line separator; 48-inch leads; a six-foot thermocouple probe; alligator clips; batteries and an instruction manual. *Triplett Corp. Circle 105 on Reader Service Card.*

FM transceiver

The Model HT-910 solid-state portable FM transceiver is said to meet all FCC type acceptance requirements. The unit features a single conversion receiver, a monolithic crystal filter, and solid-state T-R switching. The transceiver, which measures 1 9/16 inches deep by 3 1/16 inches wide by 8 5/8 inches high and weighs 1.625 pounds, is equipped with five channels. There are plug-in crystals to facilitate channel change. Jacks for external microphone, speaker, and earphone are included. Also included is a BNC antenna connector and a heliflex antenna. Accessories include a tone encoder/decoder, microphone, leather case, earphone and an automatic battery-charger. *International Signal and Control Corp., ComData Division. Circle 106 on Reader Service Card.*

Display controller

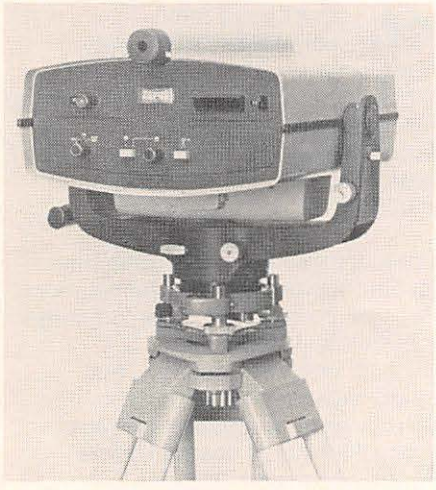
The RO200D2 Teletype Add-On Display Controller is designed to add local, remote and multiple CRT display to existing Teletypes. The unit can interface directly between the computer and Teletype, using the current loop interface of each. This eliminates the need for modems. There are display formats of 32 by 16, 80 by 16, and 80 by 24, with a 64 ASCII alphanumeric character repertoire. An underline cursor and switch-selectable page and roll mode operation are standard. A built-in memory stores the full screen of up to 1,920 characters of data. *Ann Arbor Terminals, Inc. Circle 107 on Reader Service Card.*

Viewer

The HV 101 Viewer is designed to read aperture cards and microfiche to 48x through a system of interchangeable lenses. The device has a self-contained battery-powered light source. *Exac-Tics Corp. Circle 108 on Reader Service Card.*

Digital counter

The all-solid-state, panel-mounted Slimline digital counter is 9/16 inches thick, has a red light-emitting diode display, parallel BCD outputs, and remote control inputs. A snap-in panel covers manual controls. The unit is contained in a cast metal case. *Nationwide Electronic Systems. Circle 109 on Reader Service Card.*



Distance meter

The Model 3805A Distance Meter has automatic digital readout with a built-in computer to check distance accuracy. The all-solid-state, six-digit readout can be set to read feet or metres with the flick of a switch. Accuracy is said to be ±0.02 feet plus 0.01 feet per 1,000 feet or ±0.007 metres plus 0.01 metres per 1,000 metres with a one-mile or 1,600-metre range. A built-

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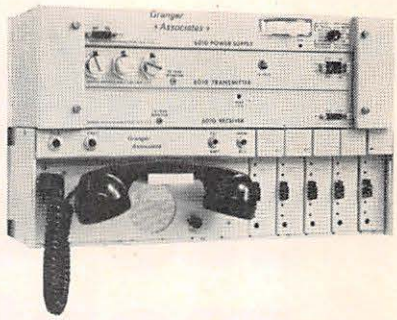

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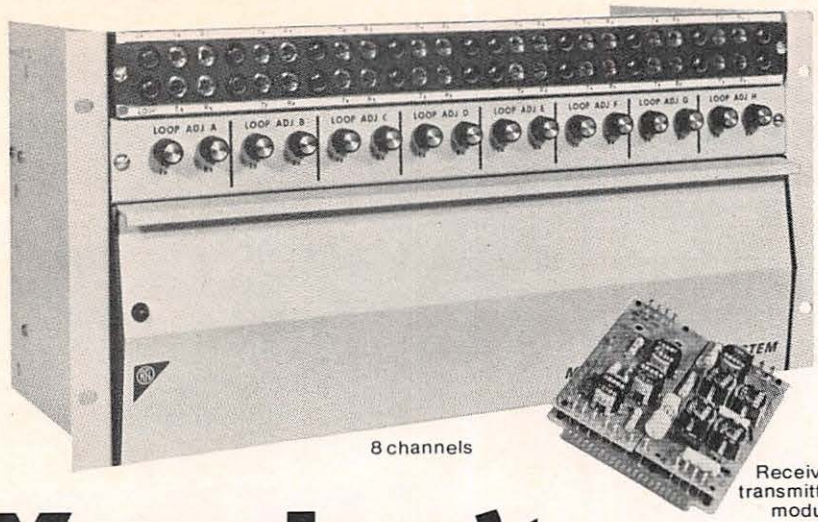

8 channels

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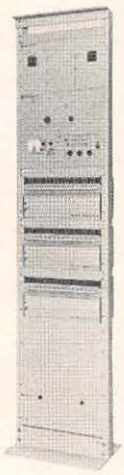
The chassis shelf also includes audio jacks, loop-monitor jacks, loop current adjust potentiometers and a loop option plug for conditioning telegraph currents over a broad range of voltages—from 130V, 20mA, to 48V, 60mA.

Ancillary equipment such as loop power supply, test meters and distortion measuring instruments can be supplied. The entire system may be purchased in a rack or cabinet arrangement, or as individual channel banks providing flexibility for future expansion. RFL has been designing and manufacturing modems for more than 20 years. We support all our communications products with system engineering and service anywhere in the world. For full information and specifications, contact either of the main offices below.



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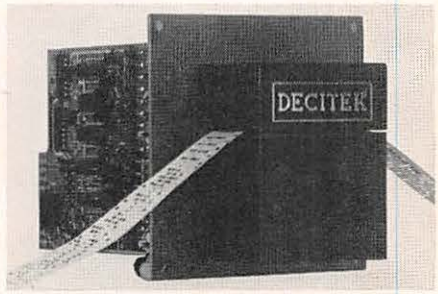
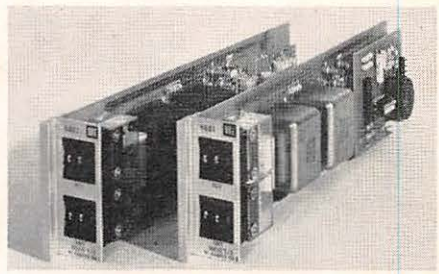
in single dial adjusts for temperature and barometric pressure correction. The unit, which weighs 19.2 pounds, requires 12 volts dc power. Operating time is said to be two hours or about 100 measurements. A shipping case and a back-pack carrying case are standard equipment. Rechargeable nickel-cadmium batteries are optional. *Hewlett-Packard Co. Circle 110 on Reader Service Card.*



Tape reader

A photoelectric punched tape reader, SAM, is designed to handle all standard six-, seven- or eight-level tapes, center or advanced feed hole, of paper, paper-polyester, or metallized-polyester. The reading is done by a single light source, fiber-optic distributor, and a nine-element photo-transistor sensing system. A high-performance stepping motor and dual-sprocket drive system carries the tape through the read head at 0 to 100 cps asynchronous, bi-directionally, and stops on character. The dual-sprocket drive eliminates tape skew and the need for edge guides, capstans, pinch rolls and brakes. Twenty-four volts dc are needed for the drive motor and five volts dc for the electronics and light source. *Decitek. Circle 111 on Reader Service Card.*



Termination sets

The 6681, 2, 3 and 4 Term Sets are designed to give high-density, two-wire termination of a four-wire facility. They contain an internal compromise network, NBO capacitors and thumbwheel switch attenuators for 600-ohm impedance toward the line, and 600 or 900 ohms toward the drop, depending upon the model. *Wescom, Inc. Circle 112 on Reader Service Card.*

Electrification: What lies ahead?

There are those who argue that "containerization has a great future—and it always will." This, despite significant and substantial gains in the COFC part of TOFC/COFC over the past few years.

There are also those who contend that railroad electrification has a future like that: Great, but always just a future and not something to be taken seriously in any "present," now or later.

But, what about electrification, really? What about the experience gained from the Muskingum Electric? What about the Black Mesa & Lake Powell, now scheduled for dedication in mid-March? What about the investigations CP Rail has been making? What about the catenary section Union Pacific is making? What about the studies a dozen or more major railroads have made or are making? What about Electro-Motive Division of General Motors, which is shooting for 1975 out-shopping of two prototype straight-electric locomotive units?

"What about" is simply that all this activity almost has to lead to something concrete—with, probably, a number of new problems for communications and signal people to contend with.

Consider, for instance, the Black Mesa & Lake Powell. It's not an ordinary railroad, since it handles only coal and will have no rail connections: It will be strictly a mine-to-power-plant operation. It will also operate as a 50-kv a.c. installation, requiring just one substation over its 78-mile route and making use of a lightweight catenary system with a combination ground return and lightning-shield wire positioned over the catenary wire so as to achieve low line impedance.

Consider also what EMD is looking at—which is development of a capability to compete in the motive-power market (with General Electric) should U.S. railroads make a major move toward electrified operation. EMD is now planning to build two different prototype models, one of 10,000-hp diesel equivalent, 8,500-rail-hp equivalent, with B+B+B wheel arrangement; and the other of 6,000-hp diesel equivalent, 5,100-rail-hp equivalent, with C+C wheel arrangement. The smaller unit is scheduled for first-quarter 1975 completion, the larger one for completion about three months later.

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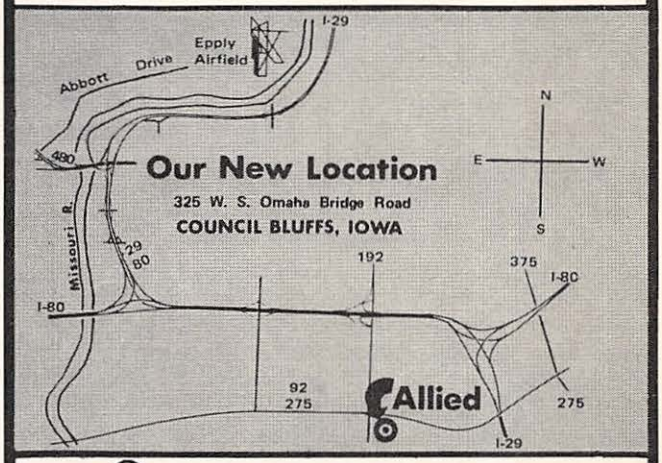

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Editor's corner

Basic problems: Solving the NE doesn't solve them all

It remains to be seen what happens in the Northeast—because even though there's a law on the books now providing for a restructuring in the area, there's no real guarantee that what the law contemplates happening will really happen. There were, by the current count, more than a half-dozen Northeast railroads in reorganization; Penn Central was the biggest, but there were also such as Jersey Central, Reading, Boston & Maine, Lehigh Valley and so on. The law passed by Congress and signed by the President provides that the courts considering each reorganization decide whether the bankrupt roads should go with the restructuring plan or try to work things out through normal, income-based reorganization under the law which pre-existed 1973's Northeast reorganization law.

DOT announced its plan for the Northeast Feb. 1 (Page 4). But, simultaneously, or virtually so, a couple of other things happened. Jersey Central filed with the ICC what it described as "a bold new plan to assure the continuation of the free enterprise system of rail transportation for the users of rail service in New Jersey." Boston & Maine said it would seek the permission of the B&M bankruptcy court "to continue the reorganization of the railroad under Section 77 of the Bankruptcy Act, rather than risk being forced into the new Consolidated Railroad Corporation which is provided for in the Regional Rail Reorganization Act of 1973, recently passed and signed into law, primarily as a means of saving the Penn Central Transportation system from total liquidation." And, the constitutionality of the Act itself came under challenge.

Meanwhile, other criticisms of the Act were heard, some of them based upon the employee-protection provisions involved, and Burlington Northern Chairman/Chief Executive L. W. Menk had an answer for the complaints. Those who find fault with these provisions, he said, ignore "two realities: (1) The nation was not going to get a solution in the Northeast without the cooperation of rail labor, and (2) there would have been ice hockey played in hell before organized labor would turn its back on the several thousand workers and their families who could be made economic orphans by consolidation." As Lou Menk put it, "Government transportation policies since World War II were principally to blame for the disasters in the Northeast, and rail labor was determined to be included in the reparations package." Few who know what's been happening could argue all that much.

Who's realistic, and who isn't—and why

If some or all of the Northeast bankrupts think they can get it all together in the traditional way, it's certainly their right to try—subject, of course, to court approval. And if there are protests against the sums which may be paid to adversely-affected employees, let there be protests—because in fact, the protection provided does seem to be something bordering on the excessive, even considering what's gone before.

At the same time, all-concerned should pay attention to what BN's Menk said. It is quite true that nothing would have happened, had there not been adequate (or more than adequate) employee-protection. But it is even more true that the problems of the Northeast—and the growing problems of railroads everywhere—can be laid largely at the doorstep of government.

So, maybe the thing to do—regardless of what instant thoughts are on the Northeast—is to try to get a rational Federal policy on railroads and on transportation totally. That's one great point on which rail management and labor can cooperate. And maybe even the public, too.

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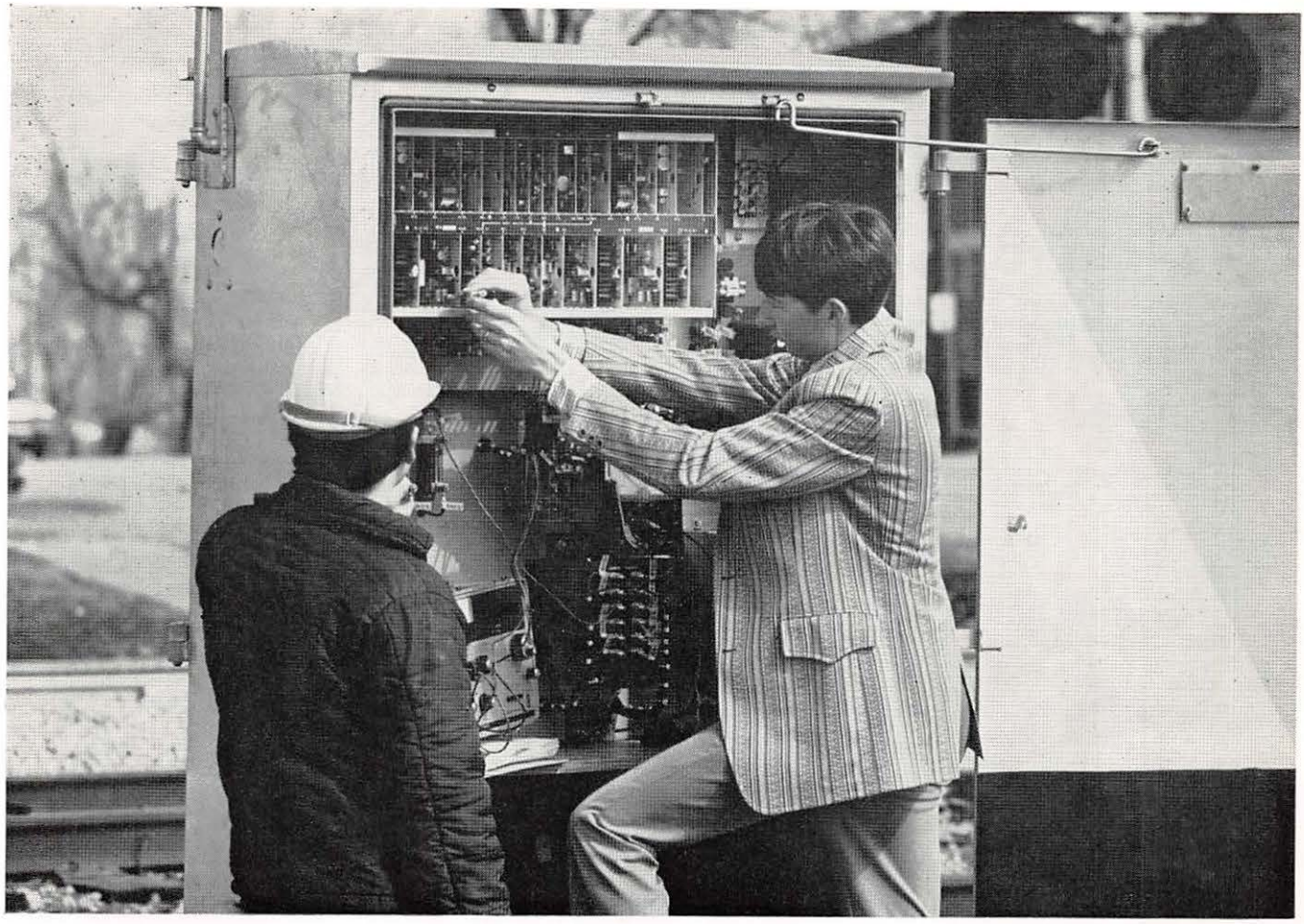

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Our testing and quality control procedures are so tough we don't expect things to go wrong with our equipment. But if...just if...a problem pops up, you can depend on Harmon to trouble-shoot the difficulty with fast, in-field service. We even fly in servicemen in one of our planes. Fast, in-field service. It's as easy as placing a telephone call. Just one of the extras that makes Harmon more than hardware.

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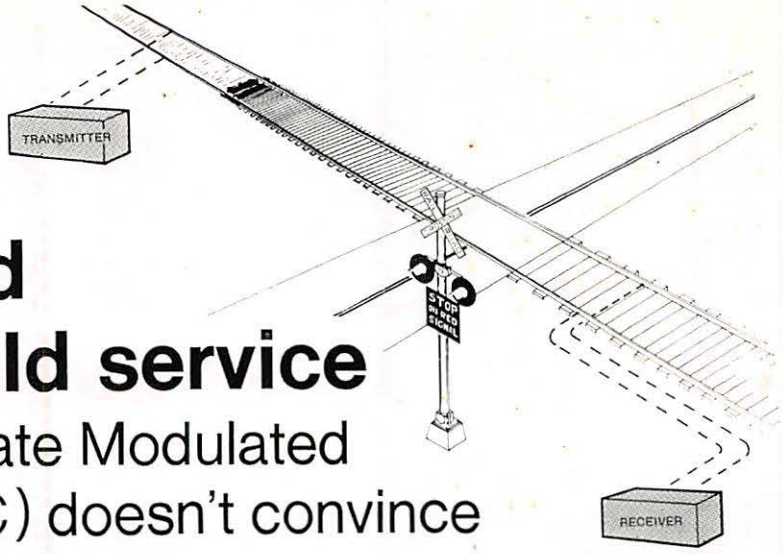

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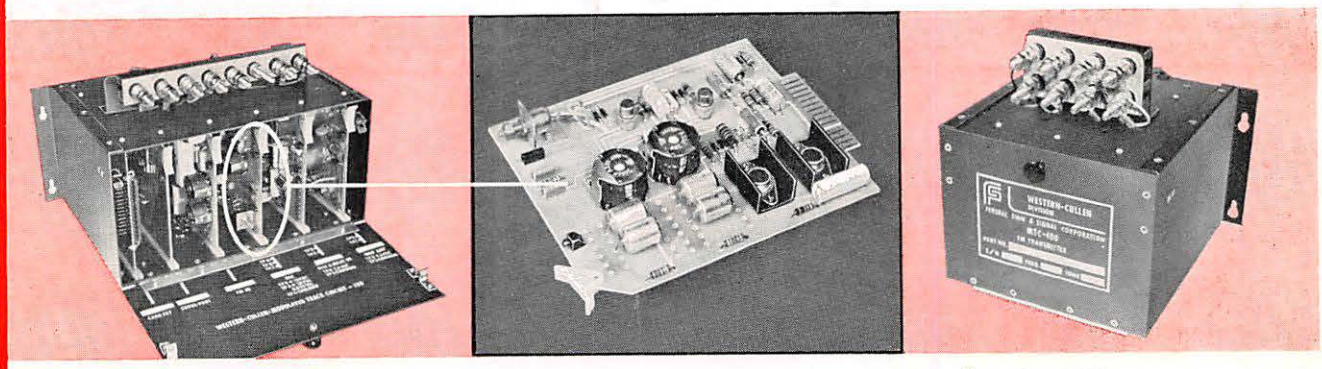

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